AVIATION WEEK

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SEPT. 20, 1954

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No longer does each fuel gage indicator require its own amplifier. With the development of the new Honeywell Multiplex System, one amplifier can serve two indicating systems – receiving and sorting signals from two different tanks.

The new completely transistorized Multiplex fuel gage eliminates one amplifier for every two indicators, with the resulting saving in weight and cost.

Another big saving is achieved through the elimination of cabling because, in the new system, one shielded lead is common to two indicating systems.

The Multiplex System is the latest of many new Honeywell developments in the field of aviation controls. There'll be more, because automatic control is so important to aviation's progress. And automatic control is Honeywell's business.

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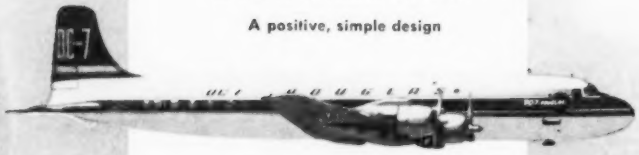

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3,472,300 people couldn't wear it out

THIS SLOPING RAMP is at a B. F. Goodrich plant. It's covered by test strips of Avtrim flight rugs. The samples include five finishes, 10 colors, six types of underlay. This Avtrim has been walked on by an estimated 6,944,600 shoes during the past five years. But it's good for many years more.

Avtrim flight rugs are practically immune to scuffs and scratches. They outwear woven carpeting. Yet they have a special sponge-fabric backing that gives you a comfortable, cushiony feeling. And they're available in varied colors and finishes to go with any decorating scheme, with none of the maintenance problems of conventional carpeting.

B. F. Goodrich Avtrim resists oil, grease, fire—all ordinary stains and chemicals. Spilled materials don't soak in. They can be wiped up easily. Avtrim eliminates costly dry cleaning, too. You can clean an Avtrim flight rug thoroughly with soap and water without fear of shrinkage or fading and without removing it from the floor.

Avtrim—without sponge underlay—makes an ideal covering for airplane walls around baggage racks, arm rests—any place other materials wear out or get dirty quickly. It fits skin-smooth over flat or curved contours. Comes in your choice of colors and finishes.

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Aviation Week

SEPTEMBER 20, 1954 VOL. 61, NO. 12

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Small, Lightweight Amplifier For Aircraft Temperature Control

New Clifford unit features unitized construction, ruggedized, miniaturized components, novel pulse element

Weighing only 28¾ oz. and measuring 4" x 3⅛" x 3", Clifford's control box marks a number of advances in the field of aviation temperature control.

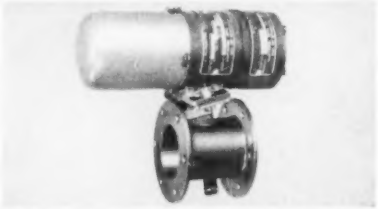
In addition to its small size and light weight, the control box design embodies several important advantages in service.

Unitized construction makes it comparatively simple to locate a malfunction in service, quickly replace the unit containing the defective component, and get the plane back into the air.

Amplifier is small, compact, employs ruggedized tubes. Components are potted in resin.

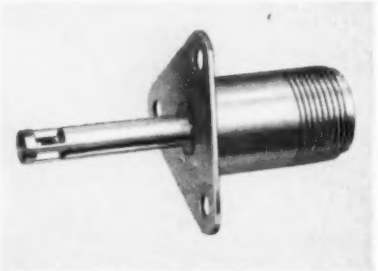
Miniaturized. ruggedized components result in the smallest, lightest control possible for the job to be done. Elements within the box comprise an amplifier, which is highly compact and potted in resin, a novel pulse element smaller and lighter than comparable units, slave relays to operate valve actuators, a power supply, a calibration unit for the electrical bridge and a radio noise filter.

Physical and electrical designs are both concerned with the performance-in-service factor. Electrical input values are held to optimum levels to insure long, trouble-free service. Physical arrangement of parts promotes maximum heat dissipation.

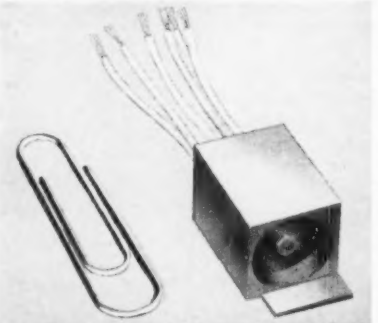


High temperature air valve and electric actuator.

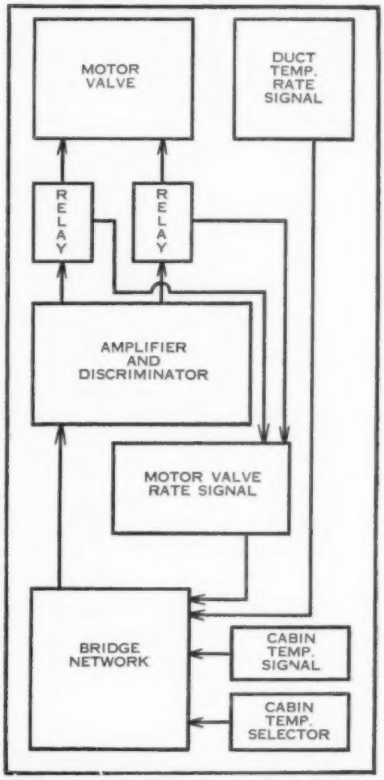
Complete system of Clifford design and manufacture encompasses temperature sensing elements, temperature selector, control box and electrically actuated modulating valves.



Sensing element consists of thermistor beads cushioned in a protective metal tube. They are sensitive, accurate, small, long-lasting and protected against environmental conditions.



Pulse unit is smallest of its kind and of novel design. Paper clip shows comparative size.



Block diagram showing interrelationships of units.

Information or consultation involving temperature control systems custom built to the requirements of specific aircraft on which you may be working is available without obligation.

Write: Clifford Manufacturing Company, 136 Grove Street, Waltham 54, Mass. *Division of Standard-Thomson Corporation.* 7.4.14

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NEWS DIGEST

Domestic

Turbine-powered transport safety requirements took top place on the agenda of Civil Aeronautics Board's fifth annual Airworthiness Review last week, as CAB Chairman Chan Gurney told the opening session that specific requirements are needed and initial action must be taken now. Transport requirements for helicopters also will share attention of the group at this meeting.

New turboprop lightplane is Cessna Aircraft Co.'s XL-19C, powered by a Continental XT51-T-1 that develops 280 hp. on takeoff and 235 meto hp. The earlier XL-19B's Bocing 502-8 delivers 210 takeoff hp. and 175 meto hp. Both planes are being used at Ft. Eustis, Va., for turboprop familiarization.

Mooney Aircraft "Mite" has rolled off the Kerrville, Tex., assembly line and started flight tests, the company's first plane since the company re-organized and re-opened after a production shutdown December 1953. The single-place "Mite," officially designated the Mooney Model 18, will be followed by a four-seat executive Model 20 in early 1955.

Rick Helicopters is moving its headquarters from Los Angeles to San Francisco, where the company has started construction of a $250,000 copter center. Owner James S. Ricklefs expects Civil Aeronautics Board to act soon on the firm's application to provide helicopter passenger, mail and cargo service to and from San Francisco's new air terminal (see p. 95).

Air Force has no immediate plans to dispose of any of its C-46 transports. "A number of these planes are leased to private commercial operators," USAF says, "and will continue to be operated by the lessees."

Lockheed Aircraft Service has signed a new USAF contract for inspection and repair of 160 C-54s.

Frontier Airlines has filed a $613 court suit against Continental Air Lines, claiming a propeller blast from a CAL transport damaged one of its planes while both aircraft were awaiting takeoff from Denver's Stapleton Airport Dec. 3, 1952.

Richard K. Waldo has resigned as planning officer for Civil Aeronautics Administration effective Oct. 1 to join Convair at San Diego as chief of market research in the commercial sales department. He will be chairman of the 1955 forum of the American Helicopter Society.

USAF's $2-million rocket sled facility on the Pioneer Mesa near Hurricane, Utah, has been started by three Las Vegas, Nev., contractors.

McDonnell Aircraft Corp., St. Louis, has won a $4,496,991 Navy contract covering maintenance parts for F2H-2P, F2H-3 and F2H-4 Banshee jet fighters.

Fleetwings has emerged again as the new name of Kaiser Metal Products' Aircraft Division at Bristol, Pa.

Thomas D. Eve, 42, president of Southern Airways, died Sept. 7 in Atlanta.

Financial

El Al Israel Airlines has borrowed $2.5 million from the Chase National Bank of New York, plans to use the loan to finance its fourth Lockheed Constellation and to consolidate its dollar position. El Al is expected to announce a decision in the near future on choice of new plane equipment following a current study of latest types.

North American Aviation, Los Angeles, has increased its regular quarterly dividend on capital stock from 50 to 75 cents, payable Oct. 6 to holders of record Sept. 21.

Continental Air Lines has declared a dividend of 12-and-a-half-cents on common stock, payable Sept. 30 to holders of record Sept. 21.

International

English Electric P.1 has exceeded the speed of sound and gone well beyond Mach 1 with "complete absence of buffeting," reports British Minister of Supply Duncan Sandys.

Sncaso Trident, experimental French interceptor expected to exceed Mach 1.5 in level flight, has made its first rocket-propelled test. The prototype Trident is powered by SEPR rocket engines, uses two wingtip-mounted Marbore turbojets as auxiliary powerplants.

Handley Page Herald has been put into production, with first flight of the new high-wing feederline transport scheduled for next year. Commercial deliveries of the four-piston-engine airliners are expected to begin in 1957.

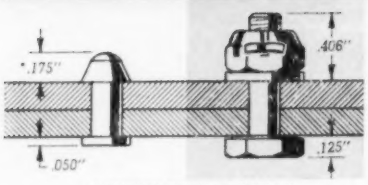
Cruzeiro twin-engine transport crashed in Rio de Janeiro's Guanabara Bay last week, killing two of the 26 persons aboard.

First all-helicopter unit has been formed by Royal Canadian Air Force at Bagotville, Que. Six Piasecki H-21As will operate with Sabre Mk. 5 and CF-100 squadrons at the base.

NAA Tests New F-86K Fighter for NATO

Slated for North Atlantic Treaty Organization countries is this modified North American F-86D, designated the YF-86K. The all-weather interceptor made its first flight at Los Angeles International Airport July 15. Fuselage of the F-86K is eight inches longer than the D, stretched to maintain balance after a switch from the previous model's 24 Mighty Mouse rocket armament for four 20-mm. cannon. The F-86K Sabre features a North American-developed fire control system. Powerplant is a General Electric J47-33 of 5,600 lb. thrust plus afterburner. An undisclosed number of F-86Ks will be built by NAA; others are to be produced in Italy by Fiat.

3 hi-shear FACTS THAT COUNT!



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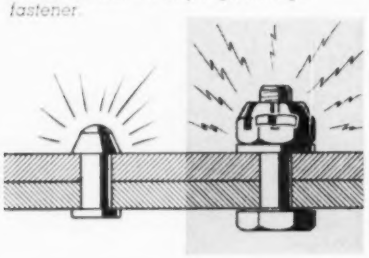
maximum protrusion

HI-SHEAR rivets have the smallest "headed ends" of any high strength fastener.



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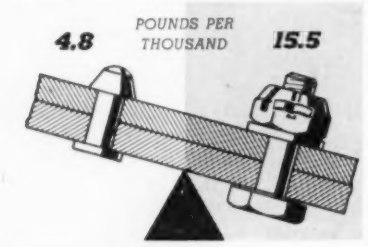
The smooth spherical rivet end eliminates chafing of adjacent fuel cells or other equipment. HI-SHEARS eliminate hazards in aircraft areas which are accessible to the flight or maintenance crews, passengers and cargo.



less weight

HI-SHEAR rivets are the lightest, standard high strength fasteners in the aircraft industry.

Installed fastener size and weight shown above are based on HI-SHEAR HS52P-6-5 pin and HS15-6 collar compared to AN3-5 bolt, AN310-3 nut and AN960-10 washer.

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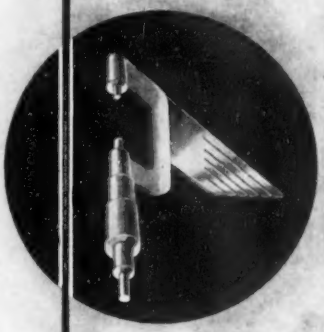

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Washington Roundup

Cut Airline Rates?

Senate Appropriations Committee took both sides of the question as to whether government agencies should try to get bargain transportation rates from carriers. In its report on the $2-billion supplemental bill, the committee:

• Declared that government agencies should not take a shortsighted view and oppose rate increases simply for economy reasons but should consider the national asset of a strong transportation system.

"Efficiency and proper service cannot long be maintained by carriers and utilities unless they are accorded a rate structure that will provide them with sound credit and yield them a fair return," the committee said. "The importance of these considerations far outweighs the importance of a showing of greater economy in a department's expenditures for transportation."

• Recommended an amendment under which Defense Department could obtain air transportation at free or reduced rates. Strongly opposed by Civil Aeronautics Board, which says the cheap rates for defense business would have to be balanced by higher rates on other traffic, the amendment was withdrawn on the Senate floor.

Service Mail Split

Trunk airlines are split on the question of domestic service mail pay. The shorthaul carriers want a rate that gives weight to landing costs. Longhaul lines are satisfied with a straight ton-mile rate. Eight shorthaul carriers have proposed a rate of 36.25 cents a ton-mile, plus 5.7265 cents per pound enplaned. They are: Braniff Airways, Colonial Airlines, Capital Airlines, Delta-C&S Air Lines, Eastern Air Lines, National Airlines, Northeast Airlines, and Western Air Lines.

United Air Lines has proposed continuation of the 45-cents-a-ton-mile rate for the big lines. TWA also wants a flat ton-mile rate, but one more nearly approaching the passenger rate of 60 cents a ton-mile.

Slick Airways is intervening in the case to assure that the service rate established does not include an element of subsidy.

Europe Visitors

Autumn flow of Defense Department travelers to Europe will continue Sept. 24 when Robert B. Anderson, Deputy Secretary and Fred A. Seaton, Assistant Secretary for Legislative and Public Affairs, take off for a month's trip. They will witness "Battle Royal," land and air maneuvers to be held in Central Europe by NATO forces late this month. Next, they will make inspection of U. S. forces and installations in nine countries.

Navy Copter Competition

Navy's Bureau of Aeronautics is currently working on a new anti-submarine helicopter competition in which interest centers around improved powerplants. Best guess: Winning design will utilize some type of turbine engine, capable of hovering at 65% of normal power, a feat that cannot be done by any existing reciprocating engine.

Navy interest in a helicopter with real hovering performance, plus other military and possible commercial demands for greater lift and lower maintenance costs are expected to spur manufacturers into improved designs.

USAF Procurement Rules

New loose-leaf volume of "Air Force Procurement Instructions" will be off the press and ready for distribution about Nov. 1. No final price has been set, but Pentagon guess is that contractors will be charged about $6.75 for first boiled-down compilation of rules for doing business with Air Materiel Command.

Manuscript for original text was closed May 1 and Revision 1, to be issued with the book, will make first volumes up to date. Page-by-page revisions will be issued about six times a year to keep handbook current. When ready and price is finalized, copies can be obtained from Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C.

New book is a digest or manual that replaces that maze of duplicating and overlapping directives, orders, letters, regulations and instructions issued in the past by Defense Department, USAF, AMC, and other offices concerned with procurement.

MATS Award

Crash of Military Air Transport Service C-124 last week at Thule AFB, Greenland, with 10 fatalities came at most awkward time for MATS. Public information office already had distributed releases covering next day's ceremony at Westover AFB, Mass., headquarters of Atlantic Division, to celebrate six-month flying safety record.

Award presentation was held on schedule, pointing out division's outstanding achievement in first six months of 1954 of 93,800 hours without an accident.

In 19 months from Jan. 1, 1953 to July 31, 1954, service airlifted in worldwide operations 747,000 passengers and 84,500 combat casualties without loss of life.

Convertiplane Report

Air Coordinating Committee's policy report on convertiplanes, originally prepared by Col. William C. Bunker, former chief of Army Aviation Transportation Corps., is now at the Department of Defense for review of its policy recommendations.

After the Defense comments are received, it will be reviewed by a "middle echelon" of the ACC for economic factors. Final step will be consideration of the top ACC group to produce the combined thinking of all the separate government agencies that are now or later will be concerned with convertiplanes.

Budget Review

Midyear budget review last week contained no surprises for the aircraft industry. Fiscal 1955 defense spending will go down $2 billion from earlier estimates, including an $800-million reduction in Air Force outlays. Major item here is $325 million held up by delays in base construction. About $260 million is attributed to cuts in aircraft procurement.

Offsetting this, industry can expect its guided missile backlog to grow while aircraft orders stick pretty close to present level. Total aircraft procurement during rest of fiscal year—for both Air Force and Navy—will run a little less than $8 billion. This is $390 million less than estimated when President Eisenhower gave his budget message to Congress last January. **—Washington staff**

INDUSTRY OBSERVER

► The Bristol Proteus probably is the quietest gas turbine engine now flying. Installed on the de Havilland Ambassador as a flying test bed at the Farnborough show, two Proteus turboprops were barely audible from 100 yd. away on takeoff and landing. Four Proteus engines installed on a Bristol Britannia also proved quiet in flight.

► **The Gloster Javelin, delta-wing, all-weather fighter, has reached sonic speed in shallow dives. In addition to 30-mm. cannon, the Javelin carries rocket armament.**

► U.S. observers at Farnborough noted NACA influence in recent British highspeed fighter designs. A horizontal tail set low on the fuselage, like that in the North American F-100 Super Sabre, appears in the Folland Midge and English Electric P. 1. This is in contrast to the earlier British approach of high tails used on the Javelin and Victor.

► **The dive flap installation on the Hawker Hunter is reminiscent of the quick fixes used on some USAF aircraft. The Hunter brake extends from the bottom of the fuselage aft of the wing. Neither the Hunter nor the Supermarine Swift yet has a flying tail. Both use variable incidence tails.**

► Short Brothers and Harland, Ltd., S.B. 5 research plane for the English Electric P. 1 is resuming flight tests at Boscombe Down with a 69-deg. wing sweep-back. Plane so far has flown with eight different configurations of variable-sweep back wings and an adjustable tail. British call the unique wing plan of both planes "notched delta."

► **Napier claims its 3,000-hp. Eland turboprop engine has the most efficient compressor of any gas turbine now flying. A compression ratio of 15 to 1 is claimed for the 10-stage axial compressor. The Eland performed at the Farnborough show using a Vickers Varsity as a flying test bed.**

► Short Seamew appeared at the show with a vented tail and fixed wing slats. The tail vent is aimed at smoothing the turbulent flow at the joint of the horizontal and vertical tails, and has a large intake and small exit. The fixed wing slats are installed to give better lowspeed handling.

► **First nibbles on new foreign orders at Britain's Farnborough show came from representatives of Alitalia, the Italian airline, which showed interest in the Vickers Viscount. Japanese also are discussing the purchase of Percival Aircraft's Provost jet trainer. British aircraft exports now are running slightly behind last year's record.**

► Sore point among British aircraft manufacturers is lack of progress in helicopters, but they are aiming now to catch up with the U.S. by developing large transports powered by gas turbines. Adding fuel to the situation was a large model of the Sikorsky S-56 displayed at Farnborough by Westland Aircraft with British European Airways markings. BEA also exhibited an S-55 which will begin passenger service next year from Thames Heliport in downtown London.

► **Trevor Gardner, Special Assistant to the Secretary of the U.S. Air Force for Research and Development, flew the Vulcan, Camberra and Comet during the Farnborough show. Gardner also visited a secret missile test center in Wales, Britsol Aeroplane Co., and Folland.**

► The Bristol 173 helicopter displayed at Farnborough showed that the stub wings have been cut down both fore and aft, while "V" tail fins have been replaced for stability. Theory is that big stub wings are useful to unload the rotor on transport helicopters but are not needed on military versions, where vertical operations and hovering are most important.

► **A flat picture tube, which eliminates most of the bulk of conventional cathode ray tubes, offering important advantages for radar as well as TV, has been developed and demonstrated to military and industry people. New tube reportedly is readily adaptable to color.**

WHO'S WHERE

In the Front Office

John P. Riddle, president of Riddle Airlines, and directors **Thomas F. Skinner** and **Phillip Moore** are members of the air carrier's new three-man executive committee.

A. S. McDonald has been appointed executive director of Canada's Air Transport Board at Ottawa. **G. Morisset** has become chief of the International Relations Division.

Harry C. Bass, Jr., has been elected president of Selb Manufacturing Co., St. Louis, aircraft parts producer. Other changes: **Del Boyd**, vice president; **A. H. Bollenbach**, secretary-treasurer; **Kenneth Hunn**, general superintendent; **J. E. Jones**, methods engineer; **R. M. Hanke**, production control manager; **George Langeneckept**, quality control manager, and **James W. Slowe**, director of government contracts and machine tool procurement.

Robert L. Earle, onetime vice president of Curtiss-Wright Corp., has joined Marquardt Aircraft Co., Van Nuys, Calif., as vice president-administration and assistant to the president.

Ford Studebaker has moved up to executive vice president of Hawaiian Airlines. **David Watson** is new vice president-controller and a director.

Changes

John D. van der Veer, formerly associated with Civil Aeronautics Administration in navaid development, has become assistant general sales manager of Tung-Sol Electric, Inc., Newark, N. J.

Dr. Louis G. Dunn has resigned as director of the Jet Propulsion Laboratory at California Institute of Technology, Pasadena, to join Ramo-Wooldridge Corp., Los Angeles, as associate director of the new Guided Missile Research Division. **Dr. William H. Pickering** is new director of the CalTech lab, and **John J. Burke** has become chief of its Guided Missile Electronics Division.

Rear Adm. W. V. R. Vieweg (USN Ret.), former commanding officer of Navy's Ordnance Test Station at Invokern, Calif., and one time commander of Fleet Air, Hawaii, has joined General Dynamic Corp.'s Electric Boat Division at Groton, Conn., as special assistant to the chief research and development engineer.

Col. George F. Hartman (USAF Ret.) has become director of the aviation applications section of Yardney Electric Corp., New York.

Honors and Elections

Arthur E. Raymond, vice president-engineering of Douglas Aircraft Co., will receive the Spirit of St. Louis Medal at the annual meeting of American Society of Mechanical Engineers Nov. 29-Dec. 3 in New York.

Benjamin F. Greene, Jr., electronics engineer at the Air Force Cambridge (Mass.) Research Center, has received a USAF commendation for his development of the VOLSCAN air traffic control system.

HAMILTON STANDARD . . . leader for years in propeller design and production, is now supplying other essential equipment for such outstanding new jet aircraft as the Boeing 707 tanker-transport.

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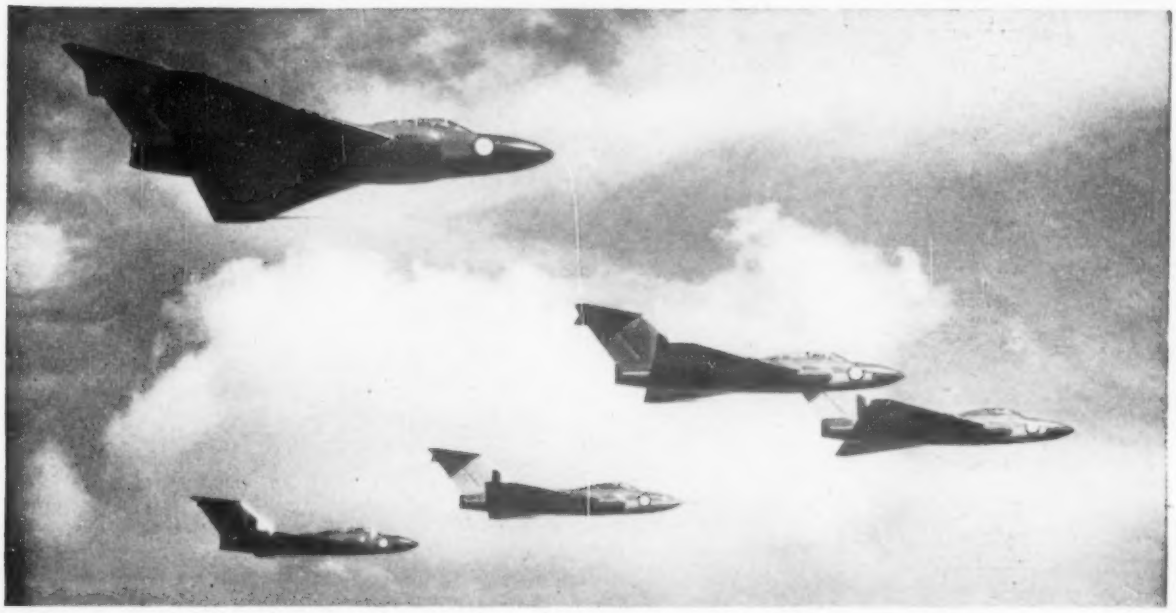
AVIATION WEEK VOL. 61, NO. 12
SEPTEMBER 20, 1954



JAVELIN QUINTET flies over Farnborough to accent British air industry's No. 1 goal—production, not prototypes.

Production Aircraft Take SBAC Limelight

By Robert Hotz

Farnborough—The accent was on production models and payloads rather than experimental prototypes and spectacular flying at the fifteenth Society of British Aircraft Constructors' flying display.

More than 5,000 foreign visitors from 90 countries and 250,000 Britons were attracted to this quiet country village by the week's show.

▶ **Criticism Felt**—The British aircraft industry is smarting because of the flow of foreign and domestic criticism over long delays in getting new aircraft from the prototype stage into production. Another source of criticism is the constant display of experimental aircraft while, with few notable exceptions, the Royal Air Force and British airlines are forced to operate either obsolescent or foreign equipment.

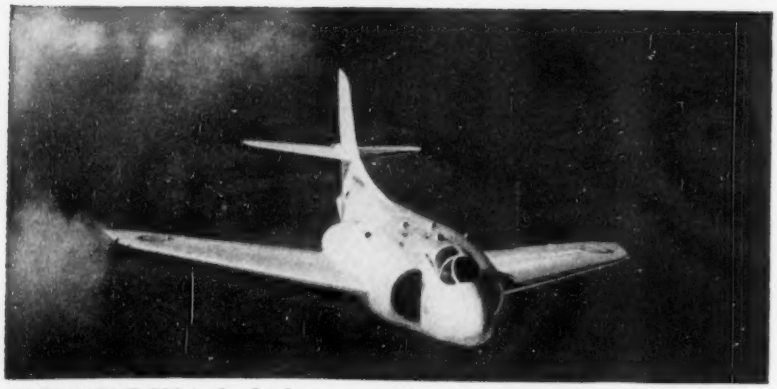
At Farnborough this year SBAC made a determined effort to answer critics by shifting emphasis to a traditional show.

Only two really new prototypes were flown—the spectacular Folland Midge lightweight fighter and the Supermarine 525 navy fighter. The prototype of the English Electric P.1, a fighter that already has flown supersonically in level flight, was deliberately withheld from the show. This was partially because of security, but mainly because it was felt that it would not be wise to display the aircraft publicly so long before it will be ready for production and RAF service.

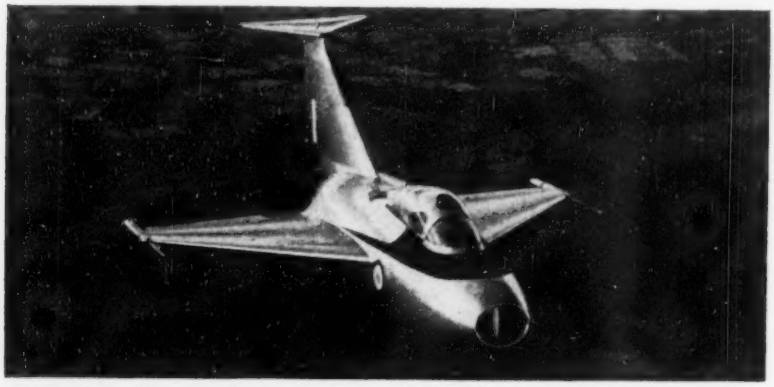
▶ **Production Swifts**—Hawker Hunters and Supermarine Swifts, a familiar sight in experimental forms to Farnborough visitors since 1951, were displayed with the production models decked in new RAF camouflage and armed with combat service loads of rockets, cannon and bombs.

Gloster Javelins, all-weather delta-wing fighters, flew in a five-plane formation which included three production versions with modified leading edges on the wings. Transport aircraft appeared with airline markings, indicating

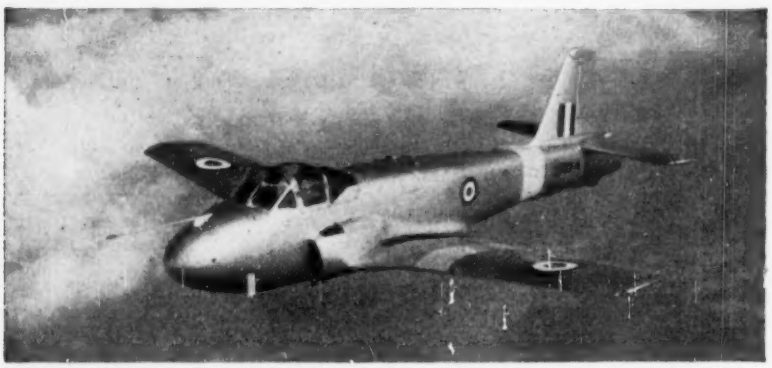
POTENTIAL CUSTOMERS and engineers get closeup view of latest British military, civil types displayed at Farnborough.



SUPERMARINE 525 is the development prototype of a supersonic twin-jet naval fighter.



FAIREY FD-1 delta research plane is being used in studies of new VTO missile projects.



HUNTING PERCIVAL JET PROVOST seats two side-by-side for primary flight training.

SMALL SOAR JETS, rated at 1,810 lb. thrust, are tested on wingtips of Gloster Meteor.

that they were sold and headed for active service.

Static displays emphasized the heavy armament carried by such service aircraft as the Fairey Gannet and the English Electric Canberra, including mines, napalm and atomic weapons with high drag configurations.

► **'Get On With Job'**—This air of "let's get on with the job" also was apparent in the brief appearance at the show of certain aircraft. The first production model of the Bristol Britannia returned to the Filton factory before the show ended to pursue its flight testing program. Three Javelins returned to Moreton Valence after a single day's flyby to speed introduction of the first squadron into RAF service.

Vickers was forced to borrow a Viscount which was built for Trans Australia Airlines and relinquished it in the final days of the show to meet the delivery requirement.

Duncan Sandys, British Supply Minister, told the annual SBAC dinner that the British aircraft development cycle must be accelerated to 18 months. In a rare official admission of delays in the production program, Sandys said the Hunter and Swift probably could have been brought into production a year earlier if the ministry had not been "overcautious."

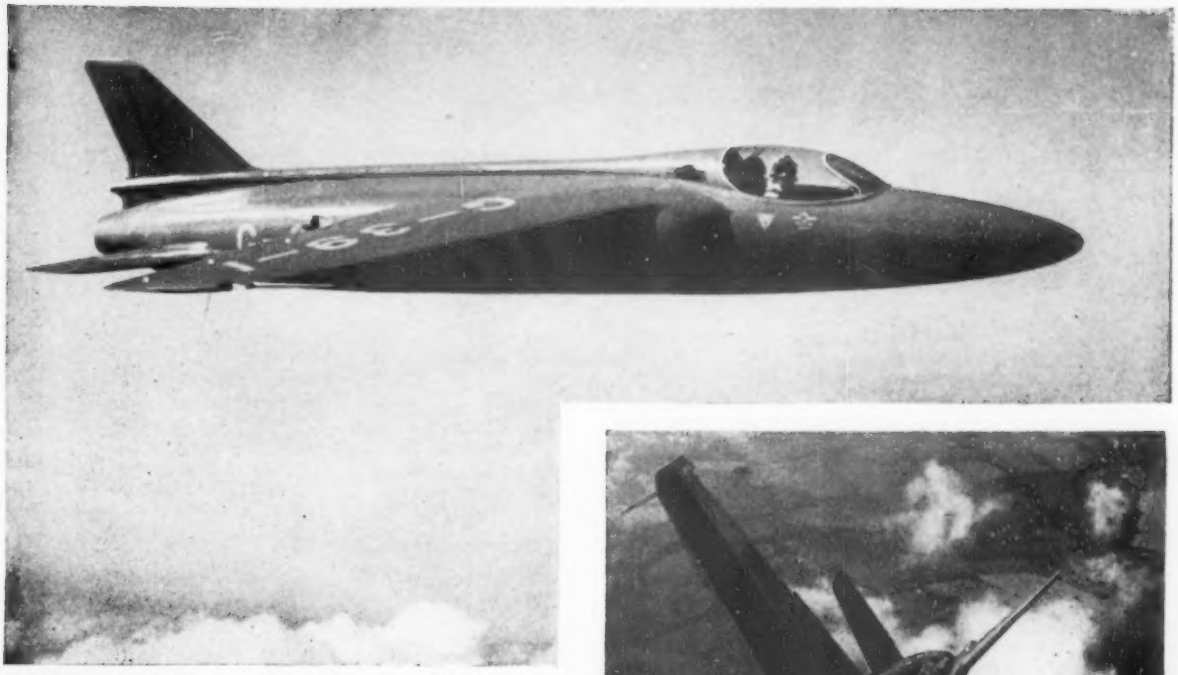
► **Adopt U. S. Plan**—Sandys said the Supply Ministry's attitude is "growing steadily more venturesome." He also announced implementation of a new plan to help cut the development cycle which is modeled after USAF's Cook-Craigie Plan (AVIATION WEEK Apr. 12, p.13).

British adaptation of the USAF plan has already been applied to the English Electric P.1 fighter with orders for five hand-built prototypes and 20 preproduction models to insure a swift test program with sufficient scope to get bugs out of the plane preparatory to faster production of the final RAF service version. The P.1 is a super-priority plane that is urgently needed for long-range interception of enemy bombers far enough from Britain to extract a heavy toll before they approach target areas.

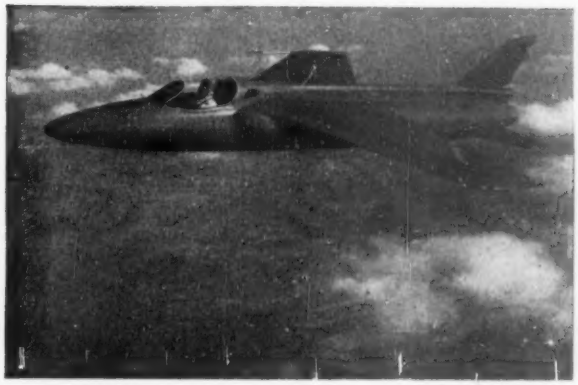
Most exciting aircraft at the 1954 show was the tiny Folland Midge prototype for the Gnat lightweight fighter (photos on p. 16).

Appearance of the Midge gave further proof, along with the earlier unveiling in California of the Douglas Skyhawk, that advocates of smaller, less-complex and less-expensive military aircraft can produce facts backing their theory.

► **Midge Attracts**—The Midge was the subject of close scrutiny by top USAF development officials, including Trevor Gardner, Assistant to the Secretary of the Air Force for Research and De-

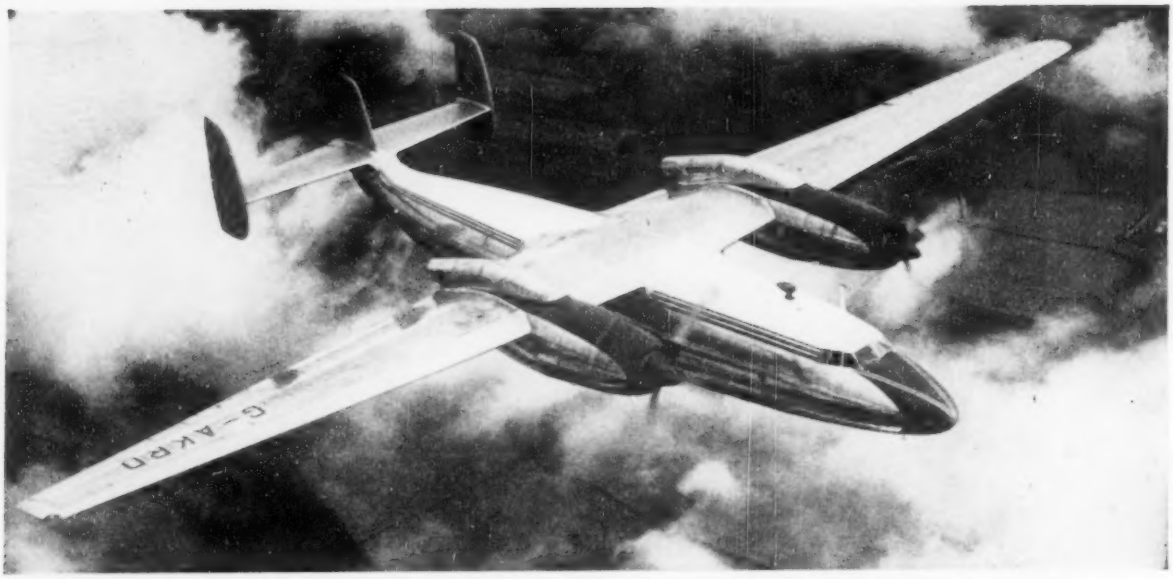


FOLLAND MIDGE fighter has two-degree wing anhedral.



LARGE COCKPIT, sharply swept, stubby wings and the "cheek"-type jet intakes are pointed up in action views of Midge.

MIDGE IS DWARFED by World War II Avro Lancaster four-engine bomber. Small all-metal fighter grosses about 6,000 lb.



MODIFIED AMBASSADOR, with two Bristol Proteus turboprops, is the flying testbed for Bristol Britannia transport engines.

velopment, and Lt. Gen. Donald Putt, Deputy Chief of Staff for Development.

A group headed by USAF Gen. Lauris Norstad, NATO air force commander, also attended to see the Midge perform. A big NATO production order for a lightweight, inexpensive interceptor and fighter-bomber capable of fast production is at stake.

Midge has the same external dimensions and general design of the Gnat. Both have a 20-ft., 8-in. span and a length of 28 ft., 9 in. The wing has a 40-deg. sweepback and 2 deg. of anhedral.

▶ **Midge Facts**—The Midge grosses about 6,000 lb., but uses the 1,650-lb.-thrust Armstrong Siddeley Viper turbojet. Gnat will gross about 7,000 lb. and use the 3,500-lb.-thrust Bristol Orpheus turbojet with afterburner giving a total thrust of more than 5,000 lb. pushing a 7,000-lb. airframe—a weight-to-power ratio that is the envy of every designer.

The Midge has a horizontal tail set low on the fuselage which is a result of the visit its designer, W. E. W. Petter, made to the National Advisory Committee for Aeronautics. The Midge is one of the first British fighters using the flying tail. It is operated with the elevator acting as a servo, changing the tail angle appropriate to flight conditions. Tail is moved by hydraulic power. The remaining stick forces are trimmed out by an electric motor actuated from the pilot's control stick.

Midge has outboard manual ailerons. Gnat will have inboard powered ailerons for high rate of roll and good highspeed control. The lack of powered controls on most British transonic fighters is a sore point with test and RAF pilots.

▶ **525-Knot Speed**—The Midge now has more than 16 hours of flight time since its first hop Aug. 11. It has a top speed of 525 knots, and has reached Mach .9 in a dive. Squadron Leader E. A. Tennant capably demonstrated the Midge's flight performance, and in highspeed passes and climbs it looked more like a guided missile than a conventional fighter.

He popped the unique speed brakes, which are wheel-well doors lowered 45 deg., for a lowspeed maneuverability demonstration. The Midge has no flaps and lands hot.

The small plane's narrow 5½-ft. gearspread is apt to prove somewhat troublesome for service pilots.

The Gnat is due to fly next spring when the Orpheus will be available. It should be supersonic in level flight. The Gnat will have two 30-mm. cannon, one under each wing root tucked in the air intake shoulder as a removable package. It can also carry two 500-lb. bombs or napalm tanks externally or a dozen rockets for ground support.

▶ **Little Sacrifice**—An inspection of the Midge cockpit reveals ample room for a standard-sized fighter pilot. There is little sacrifice of equipment due solely to weight considerations. Midge has a special lightweight ejection seat built by Folland, duplicate VHF radio, distance measuring equipment, and provision for a 75-lb. airborne radar. The air intakes have a boundary-layer bleed exhausting through a vent at the top of the wing root.

All fuel is stored internally, providing an hour's duration at altitude and a half-hour for fighter-bomber missions. External tanks are designed for long-range ferry missions. Most equipment is neatly stowed in two bays just aft of the pilot. Typical of the weight-saving struggle necessary to make the Midge and Gnat a reality are a special silver-zinc battery and generator that provide standard auxiliary aircraft power but save 46 and 12 lb. respectively under the standard equipment.

Another unusual feature of the Midge and Gnat is the wing, which is built in a single solid piece and attached to the fuselage at four points. This simple construction requires only the production time for a conventional fighter tail to build a complete Gnat wing. The wing is easily detachable

Flying Skill

Visitors at the press preview day at Farnborough were treated to an incredible demonstration of British guts and flying skill.

Despite ceilings ranging from 500 to 700 ft. and a drizzling to drenching rain, pilots of all but a few aircraft put them through their paces.

The planes were controlled by ground radar with only one allowed in the air at a time.

Notable were:

- **Roly Falk wheeling the huge, white Avro Vulcan through such a heavy mist that it was barely visible at the far end of the field.**
- **Neville Duke making screaming passes below the 50-ft. minimum in a Hawker Hunter Mark 6.**
- **Dave Morgan acrobating in a Supermarine Swift with a rolling climb until only the blue flame of the afterburner was visible in the murk.**

for air transport, making it possible for a modern cargo aircraft like the Douglas Globemaster to carry half a dozen complete aircraft unassembled but ready for operation within a few hours.

▶**New Navy Fighter**—Sharing top honors with the Midge in the new fighter class was the ivory-finished Supermarine 525, prototype for a new navy carrier-based transonic fighter. Mike Lithgow did supersonic bangs in the 525, which is powered by two Rolls-Royce Avons. The performance indicates great promise for the new navy fighter to be developed from this prototype which substitutes a single tail for the "V" tail of the earlier versions. The straight wings have been changed to swept wings.

The production order for the new fighter will provide the now woefully weak fleet air arm with its first transonic modern fighter and strike aircraft for carrier operations. The production aircraft is designed to carry atomic weapons.

▶**New Hunter Version**—Neville Duke, dean of British test pilots, provided the fastest and lowest runs across the field in a new version of the Hunter with a new wing design and a 10,000-lb.-thrust Avon turbojet. Duke flew the Hunter Mark 6 from the nearby Hawker plant at Dunsfold and did not land at Farnborough.

Production version of the Supermarine Swift appeared with an afterburner augmenting the Avon engine. The de Havilland 110, twin-tail, carrier-based fighter prototype, made its first appearance with the all-flying tail fitted between the tops of the vertical fins.

There is considerable evidence of a structural strengthening of the wings and tail. A folding-wing version of the 110 is nearing completion for carrier trials.

▶**Rolls VTO**—The Fairey FD-1, a delta-wing research plane used for missile and VTO projects, made its first flight at Farnborough this year. Piloted by Gordon Slade, it surprised the crowd with its crisp maneuverability and fast rate of roll.

The British made much fuss over Duncan Sandys' disclosure of the Rolls-Royce vertical-takeoff research vehicle. Actually, it is just two Rolls Nene turbojets mounted on a four-cornered tubular framework. The pilot sits in the middle. The Rolls VTO made a free flight to 100 ft., circling by using deflected jets for control.

▶**U.S. Research**—The basic approach is similar to Bell Aircraft's tilting jets which enable the pilot to remain in a normal position during vertical and horizontal flight. An indication of the relative U.S. and British progress in this field is shown by the fact that NACA did this type of research two years ago at Langley Field, Va.

Bell completed one actual flyable prototype which was destroyed by ground fire and is finishing the second which will be ready for actual flight soon.

The British regard VTO as a promising approach to their interception problem. Several companies are actively working on prototypes, including Fairey and Avro.

▶**Shows Maneuverability**—In bombers it is still hard to beat Bill Beamont, English Electric test pilot, who made steep climbing turns from takeoff and did fighter acrobatics with the big Canberra bomber. Beamont was flying a black night-intruder Mark 8 version with fighter-type canopy and an eight-gun belly pack amidships. His demonstration left little doubt of the maneuverability possible with a Canberra.

Among others in the series of "Cranberries" flying in the show was the Mark 7 photo-reconnaissance plane with increased fuel tankage and more powerful Avon engines.

Jock Bryce made impressive low, fast sweeps with the black pathfinder version of the Vickers Valiant Mark 2. Vickers production efforts at its Weybridge plant indicate that RAF soon will have its first Valiant squadron operational.

▶**Vulcan Flights**—Roly Falk wheeled the huge white Avro delta-wing Vulcan through remarkable maneuvers at low altitude, including banks well past the vertical.

There were indications that Falk planned to roll the Olympus-powered Vulcan at the show. The project was terminated by what was amusingly designated officially as a highspeed landing accident that washed out the gear of this second Vulcan only a few weeks prior to the show.

Falk was forced to be content with 100-deg. banks in the first prototype Sapphire-powered Vulcan.

The second prototype of the Handley Page Victor began its flight testing during the week of the show. The Victor made a touch-and-go landing demonstration during the final day of the show.

▶**Engine Development**—The British show no end to their astonishing record of engine development. The wide spectrum of new engines range from the latest 10,000-lb.-thrust Rolls-Royce R.A. 28 Avon to the tiny 1,800-lb.-thrust Rolls-Royce Soar.

The Soar is a truly remarkable engine, capable of delivering as high as 2,000 lb. of thrust with a weight of

FIRST PRODUCTION Bristol Britannia turboprop with new tailpipes, made debut.

DH COMET 3 jet transport shared display honors with earlier Comet 2 during SBAC event.

Procurement Spending

Defense Department expects spending for guided missiles to more than double in fiscal 1955, increasing from $298 million in fiscal 1954, to $660 million. The following figures, released by the Defense Department comptroller, also show that aircraft procurement spending will continue at approximately the current level.

AIRCRAFT
(In Millions)

	1954 expenditures	Estimated fiscal 1955 expenditures	Unexpended balance June 30, 1955
Army	$83	$60	$169
Navy	1,998	2,150	5,347
USAF	6,253	6,100	10,615
TOTAL	$8,334	$8,310	$16,131

GUIDED MISSILES
(In Millions)

Army	—$19*	$250	$2
Navy	141	177	258
USAF	176	233	658
TOTAL	$298	$660	$918

ELECTRONIC AND COMMUNICATION EQUIPMENT
(In Millions)

Army	$232	$200	$364
Navy	274	170	182
USAF	320	305	1,024
TOTAL	$826	$675	$1,570

*Figures are "net." The minus figure means reimbursements from other accounts exceeded expenditures by this amount.

only 267 lb.—a power-to-weight ratio bordering on a fantastic technical achievement.

A Soar mounted on each wingtip was the sole power for a Meteor flying at the show. The Soar passed its type test showing a 1,860-lb. thrust, and now is rated at 1,810 lb.

The little engine has a fuel consumption rate of 1.2 lb. per hour, per pound of thrust.

Precise future use of the Soar was not disclosed, but indications are that it will be applied to vertical-takeoff projects in multiple installation for direction control, used in missiles and as auxiliary power to give interceptors fast climbing ability.

► **10,000-Lb. Thrust**—Rolls-Royce also proudly announced that the R.A. 28 passed an official type test putting out 10,000 lb. of thrust with a specific fuel consumption of .86. These engines are going into production models of the Valiant bombers. They weigh only 2,900 lb.

The latest Armstrong Siddeley Sapphire Mark 7 is also in the 10,000-lb.-thrust class. It is installed in a Canberra flying test bed and at the show rivalled the Olympus-powered Canberra in its steep rate-of-climb off the runway. The Olympus-powered Canberra demonstrated the fast, smooth acceleration of its split-compressor-type turbojet by flying 50 ft. off the runway, throttling back to almost idle and then slamming on full power and getting it within three to four seconds.

The Canberra did this several times on each pass and then on the final pass with full throttle pulled up in an incredibly steep climb until it bored jet exhaust holes in a 3,000-ft. cloud base.

► **Comets 2 and 3**—Transports were represented by the Comets Mark 2 and 3, bravely sporting British Overseas Airways Corp. colors, while the Mark 1 remained grounded.

First production model of the Britannia served notice that it will be a formidable competitor in the long-range transport market.

The de Havilland Beaver, powered by the Alvis piston engine, was airborne with six fully equipped infantrymen in just over 100 yd. and continued a steep climb to cruise altitude.

The Scottish Aviation Pioneer now being flown off 150-ft. strips in the Malay jungle demonstrated its short landing and steep takeoff ability.

As usual, the helicopter display was routine, indicating that Britain still has a long way to go to catch the U.S. in this field.

707 Operating Costs Compared to DC-6B

West Coast sources say Boeing Airplane Co. is telling airline prospects the 100-passenger version of its 707 jet Stratoliner will cost no more to operate than the economical piston engine Douglas DC-6B.

Meanwhile, Douglas reportedly is ready to cut metal on its new jet airline prototype, the DC-8. The company is said to be confident of getting a slice of the advanced military jet tanker program.

Missile Funds Since Mid-1950: $2.5 Billion

More than $2.5 billion has been made available for procurement of guided missiles by the three services since the military buildup was started at the beginning of the Korean war in mid-1950.

According to figures of the Department of Defense, Air Force received $1,057 million, Army $767 million and Navy $725 million.

Of the $2.5-billion total, $1.89 billion has been obligated for production now underway. This leaves $656 million in carryover funds and new appropriations for obligation in fiscal 1955.

► **USAF Gains**—Up to now the Army's guided missile procurement program has been the largest. Army obligations from mid-1950 through June 30 of this year totaled $743 million. This compares with $596 million for USAF and $554 million for Navy.

But the fiscal 1955 program will push the USAF program into dominant position. The $656 million in unobligated funds on hand and available for contract letting this fiscal year: USAF $461 million, Navy $171 million and Army $24 million.

► **Three Programs**—Details on the three service programs:

- Of the $461 million USAF has available for fiscal 1955, $196 million is carryover and $265 million is new appropriation. Over the past four years, USAF obligations have averaged less than $150 million annually.
- Navy was allocated $136 million in new appropriation for fiscal 1955. With a carryover of $35 million, this makes $171 million available.
- Army has been allocated no new funds for fiscal 1955 guided missile procurement and has only $24 million in carryover money available for new contracts.

Aluminum Production To Increase Sharply

Production of aluminum from new facilities created under the expansion program will reach 301,485,000 lb. during the third quarter of 1954, General Services Administration reports.

Aluminum users who fabricate but do not produce the metal will have a

minimum of 63,345,000 lb. made available to them.

Total production of aluminum during the first quarter was 260,887,000 lb., and production in the second quarter amounted to 303,407,000 lb., GSA says.

U.S. Trades Dollars For Libyan Air Base

State Department has concluded an agreement with Libya for long-term U. S. operation of Wheelus Field, USAF installation near Tripoli. The pact gives the United States operating rights for 20 years in exchange for American economic assistance to Libya.

Wheelus Field is a World War II installation reactivated five years ago. It has been operated on an interim basis since Libya became an independent state in 1951.

Under terms of diplomatic notes exchanged at the same time the operating agreement was signed, the United States will aid Libya to the extent of $7 million in fiscal 1955. Then the U. S. will contribute $4 million a year to 1960, $1 million a year to 1971.

Gen. Irvine May Take Over Hughes Aircraft

Maj. Gen. Clarence Irvine, deputy commander for production, Air Materiel Command, reportedly has the inside track for the job of general manager of Hughes Aircraft Co. to succeed William C. Jordan, who resigned recently (AVIATION WEEK June 28, p. 14).

Howard Hughes and Gen. Irvine have discussed contract terms, but reports on the West Coast indicate there is some opposition to the appointment in top Hughes Aircraft echelons.

AF Surplus Sale

Scrap, salvage and usable materiel is being offered in an auction sale to be conducted Sept. 22 by the procurement office at Topeka Air Force Depot, Topeka, Kan.

The auction will be conducted between 9 a.m. and 1 p.m. and is designated as sale No. 14-604-S-55-2. Listed by the depot as materiel to be sold:

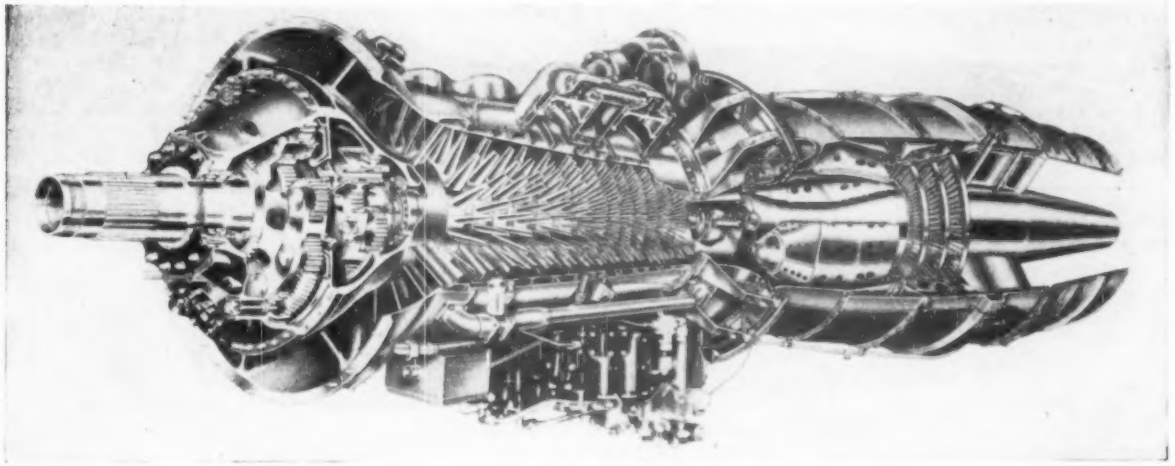
• **Salvage and usable.** Aircraft and automobile tires, tubes, shop machinery, fire fighting equipment, chemicals and acids, oils and lubricants, paints and related materials, solvents, compounds, carboys and metal containers, building material (warehouse doors), vehicle parts and accessories, pipe and fittings, plumbing equipment, heating equipment, refrigeration equipment and supplies, wood cabinets, marine-type cable and agricultural equipment.

• **Scrap.** Titanium, wrecked aircraft, stainless steel, ferrous metals, aircraft tires and batteries, scrap plastic, handling equipment, cardboard containers, waste lubricants, fuels, paints, chemicals and related materials, dehydrating agent, rubber of various pieces and types, radiators, automotive batteries and tires, aircraft and automotive tires and tubes and scrap paper (tabulating cards).

72 Railroads Fight Surface Mail by Air

Seventy-two protesting railroads have petitioned Civil Aeronautics Board for "full hearings" on continuation of the shipment of regular first-class mail by trunk airlines at cut rates.

United Air Lines and American Airlines have asked CAB to extend their



First Look Inside P&WA T34 Turboprop

First inside look at Pratt & Whitney Aircraft's T34, revealing many details not previously disclosed, comes at a time when airline interest in turboprop-powered transports is quickening.

► **13-Stage Compressor**—Stretching aft behind propeller shaft reduction gearing (11-to-one ratio) is the 13-stage axial-flow all-steel compressor preceded by a row of inlet guide vanes. Air leaving the compressor passes through two rows of exit (straightening) vanes.

Combustion chamber is a can-annular type, the forward portion is can configuration and the aft portion annular. Exhaust gases are nozzled to a three-stage turbine, with all wheels hooked to the compressor shaft.

► **Narrow Middle**—Girth of the engine narrows considerably toward the middle to accommodate accessories within the 34-in. diameter.

Length is 157.4 in. Engine weight is 2,564 lb. Compression ratio is 6.7:1. Takeoff power at sea level is approximately 5,500 eshp., while specific fuel consumption is 0.64.

Housing materials are all steel, except for the reduction gear shell, made up of aluminum and magnesium alloys. Located atop the compressor housing near its aft end is a compressor air bleed. An engine brake restrains windmilling while the propeller is feathered or when the plane is parked.

► **R7V-2 Turboprops**—The engine powers Lockheed's R7V-2 Navy version of the turboprop-powered Super Constellation (AVIATION WEEK Sept. 13, p. 18) and also will be the powerplant for the Air Force version, the YC-121F.

Douglas' YC-124B is fitted with the T34, and it also is scheduled for Boeing's YC-97J.

Aircraft Industry Backlog

Product	June 30, 1953	Sept. 30, 1953	Dec. 31, 1953	Mar. 31, 1954	June 30, 1954
	Quarter Ending:				
	(In Millions)				
Total	$18,906	$18,257	$16,752	$16,100	$15,247
Complete aircraft and parts	12,375	11,944	11,610	11,383	10,679
U. S. Military	11,614	11,210	10,846	10,664	10,012
Other	761	734	764	719	667
Aircraft engines and parts	5,304	5,173	4,080	3,597	3,361
U. S. Military	5,145	5,033	3,945	3,465	3,245
Other	159	140	135	132	116
Aircraft propellers and parts	305	261	218	193	206
U. S. Military	278	234	191	169	180
Other	27	27	27	24	26
Other products and services	922	879	844	927	1,001

Air Backlog Drops $900 Million

A backlog of $15,247 million in orders at the end of the second quarter of 1952 was reported by manufacturers of complete aircraft, aircraft engines and propellers to the Department of Commerce.

It represented a 5% decrease from the $16.1-billion backlog reported at the end of March and was 19% less than the orders on hand at the end of the same period in 1953.

Military aircraft orders accounted for 94% of the second quarter aircraft backlog, 97% of the aircraft engines and 87% of the propellers.

Orders for complete aircraft dropped 6% from the previous quarter and comprised 70% of the total backlog. Aircraft engines and parts orders, amounting to 22% of the total backlog, were down 7% from the first quarter. Orders for propellers and parts showed a 7% gain.

Net new orders received during the second quarter amounted to $1,312 million; 9% of the total backlog for the quarter. Value of sales made during the second quarter amounted to $2,165 million, 14% of the backlog.

Commerce says the reports were received from 51 manufacturers representing all companies known to be engaged in the manufacture of aircraft, engines and propellers.

authority to transport surface mail by air, when space is available, between New York-Chicago and Washington-Chicago until Dec. 31, 1955. Authorized a year ago, the authority expires Sept. 30. Delta-C&S Air Lines has requested extension of authority for the Chicago-Florida route.

The requests are supported by Post Office Department, which has extended the experimental shipment of surface mail by air to most of the local service lines (see p. 23).

Opposing UAL's request, the railroad brief estimates that air shipment of mail between New York and Chicago already has resulted in a loss of $825,000 to competing railroads and declares extension of the experiment would "make more likely the loss permanently of revenues."

ARDC Sets Up New West Coast Division

Air Research and Development Command has activated a new Western Development Division at Inglewood, Calif.

Commanding officer of the unit is Brig. Gen. Bernard A. Schriever, who recently was moved from the Pentagon to ARDC to supervise a new Convair missile project (AVIATION WEEK Aug. 23, p. 12).

ARDC said Inglewood was chosen as the site of the new headquarters because of its proximity to major West Coast aircraft plants and test facilities engaged in USAF R&D programs. The Convair plant is at San Diego.

Gen. Schriever's staff will consist of less than 100 military and civilian personnel, ARDC said.

New Rotor Tip Rockets Boost Copter Takeoffs

Development of a new rocket-assist system for helicopters was announced last week by the Navy and Reaction Motors, Inc., Rockaway, N. J.

The device consists of rotor tip-mounted liquid propellant rockets that can be turned on for short intervals to give added power for takeoff with heavy loads or at high altitudes.

Installed for test on a Marine Corps Sikorsky HRS-2 copter, the system has provided boost equal to a 20% increase in engine power.

The system is called ROR, "rocket-on-rotor," and weighs only 67 lb. for a three-blade installation.

The rocket engines burn hydrogen peroxide fuel fed from a dome-shaped tank on the rotor hub. The tank carries fuel for six minutes or enough for 20 to 25 takeoffs.

In addition to the advantage in taking off with heavy loads and high-altitudes operations, ROR can be used to improve performance of the helicopter in autorotation, the rate of climb and hovering ceiling.

Canada Cuts Aircraft Spending $32 Million

Toronto—The Canadian government is slashing defense production and spending, taking the biggest slice of approximately $32 million from air-power expenditures.

Hardest hit in the cutback is production of Canadair-built Sabre Mk. 5s.

Canada's armament expenditures dropped to $225 million during the first four months of the current fiscal year, compared with $281 million for the same April-July period last year. Aircraft expenditures totaled an estimated $77 million, dropping from $109 million.

The government gives no exact figures on aircraft cutbacks, but reliable sources report deliveries of Avro Orenda-powered Sabres is less than half the flow of last year.

Deliveries of Avro CF-100 Canucks also has declined slightly, but Canadair-built T-33 Silver Star trainers have increased.

PAA, Boeing to Boost Stratocruiser Range

Pan American World Airways and Boeing Airplane Co. are starting a $1.3-million program to improve performance of the airline's Stratocruisers (AVIATION WEEK Aug. 23, p. 11).

Increased efficiency will enable PAA to eliminate fueling stops on longhaul routes.

The first of the modified Stratocruisers is expected to be back in the air in 60 days.

Fuel capacity will be increased by 410 gal. by installation of extra tanks in the wings near the tips. Turbosuperchargers are to be redesigned; propeller speed will be cut back from 2,120 to 1,980 rpm. at cruise power, reducing cabin noise; use of cowl flaps for cooling will be cut down.

These modifications will give the planes about five miles an hour additional airspeed.

technical bulletin

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EEMCO's new rotary actuator, Model D-665, is another example of the complete services rendered by EEMCO. Designed, developed, tested and proven in EEMCO's own plant for a leading air frame manufacturer, this new trailing edge actuator has a normal peak load of 28,000 inch-pounds and a total angular travel of 30°. Other specifications are shown below. Model D-665 can be adapted to other uses and varied specifications with a minimum of time lost in design and production.

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Normal peak load: 28,000 inch-pounds
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Jet DC-8 Production Awaits Military Order

Douglas Aircraft Co.'s DC-8 jet transport—now at the point where shop drawings can be made, material procured and metal cutting started—is waiting for government backing in the form of a military order to go into production, A. E. Raymond, company vice president-engineering, indicates.

The DC-8 will be a nonstop trans-Atlantic transport without use of external fuel tanks, Raymond says. Priced at $4 million to $5 million apiece, the DC-8 is expected to operate at costs at least comparable with current aircraft.

Raymond touched on characteristics of the company's new jet project, in addition to Douglas thinking on turboprop airliners and helicopters, in a speech before the Swedish Aeronautical Society in Stockholm Sept. 4 (AVIATION WEEK Aug. 23, p. 7)

▶ **30-Deg. Sweep**—The DC-8 will have wings moderately swept to 30 deg. Cruising speeds will approximate 550 mph. Engines will be slung under the wings and will project well forward.

Control power boost has not been eliminated entirely; manual control is used for normal operation, the boost to meet extreme conditions. There are no slats or spoilers.

Considerable attention has been given to providing ease of loading, unloading and servicing the DC-8, Raymond says. Pre-loaded cargo and baggage containers plus a pre-packaged buffet and underwing fueling have been developed.

To date, the company has spent $3 million and three years on the DC-8 project, he reports.

▶ **Turboprop DC-7**—"I think we will sometime come out with a turboprop version of the DC-7," Raymond says.

This project, however, will have to await engines of low specific fuel consumption and in the 4,000-hp.-5,000-hp. class, he indicates. The powerplants must improve the DC-7's cruise speed and economy by 15% to 20% to be acceptable. "Several years must elapse before we have such an engine," Raymond says.

Douglas also sees the need for a small two- or four-engine turboprop transport for medium to short ranges. But again, non-availability of suitable powerplants apparently puts this design in the unforeseeable future.

Douglas is very much interested in helicopters, Raymond says, but sees no possibility that they will come into extensive commercial use overnight. High cost of operation and low service life will not be overcome quickly, he adds.

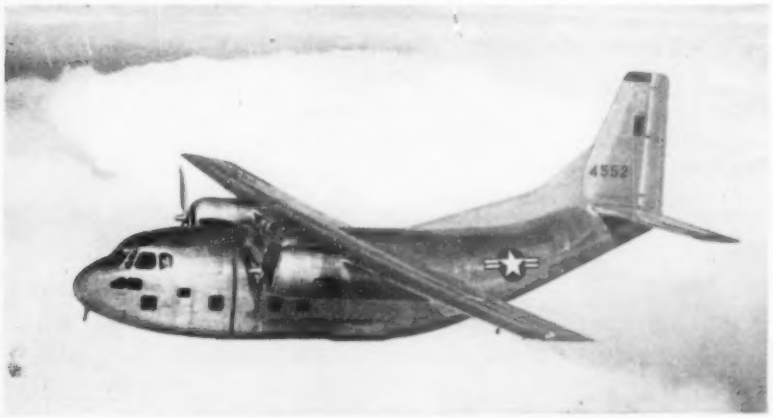
10 Feeder Airlines To Fly Surface Mail

Post Office Department has expanded its program of shipping surface mail by air at cut rates to include 13 of the 14 local service airlines.

The carriers will be paid 30 cents a ton-mile for surface shipments, on a space-available basis. This compares with airmail pay of from 75 cents to $2.50 a ton-mile.

Announcing the addition of 10 local service lines to the program, Postmaster General Arthur Summerfield said this "will enable postal patrons in more than 100 communities, in 23 states, to receive mail considerably sooner than at present.

"Regular three-cent mail will be sent by air over these routes when delivery



Fairchild Flies its First C-123B

A modified tail, having a greatly enlarged dorsal fin, marks the first model of the Chase-designed C-123B Avitruc assault transport to roll off Fairchild's production lines at Hagerstown, Md. Grossing about 54,000 lb., the C-123B has an eight-ton payload. Powerplants are two P&WA R2800s at 2,500 hp. each.

Production is "on the beam" with

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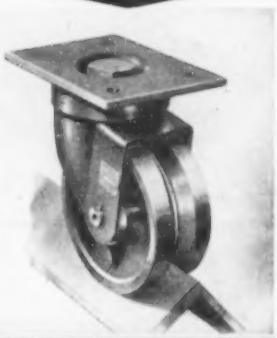

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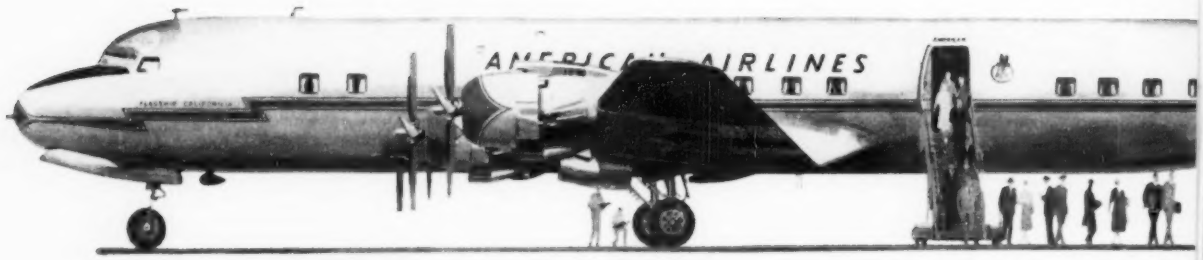

THE DC-7

Famous for nonstop coast-to-coast service, the DC-7 is America's fastest airliner, with a cruising speed of 365 miles-per-hour. American's DC-7's feature air conditioning on the ground as well as aloft. Today American Airlines has 25 DC-7's serving New York, Los Angeles, Chicago, Dallas, Washington, San Francisco, Detroit, Tulsa and Fort Worth.

THE CONVAIR

The speedy modern Convair, combining comfort and convenience, is perfectly suited to American's numerous short intercity flights. By using its unique hand baggage rack, passengers can avoid checking their luggage if they wish, thus saving time on arrival. There are 76 Convair Flagships now in service on American's routes.

There is a natural connection between the superiority of the equipment used by American Airlines and the popularity of Flagship travel. Over the years American's aircraft have always symbolized air travel at its best. And today the 188 planes that wear the American Airlines emblem represent the finest Flagship Fleet of all time. With each of the famous foursome shown above outstanding in its own field of service — from a three hundred mile business hop to a three thousand mile vacation journey — it is not surprising that American Airlines carries more passengers than any other airline in the world.

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FLAGSHIP FLEET

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THE DC-6B

This popular long-range transport and its sister ship, the DC-6, exemplify the post-war development of larger and faster passenger planes. American was first to offer this luxurious transport on its low cost Blue Ribbon Aircoach flights as well as its regular fare service. Currently, the Flagship Fleet includes 75 DC-6 and DC-6B aircraft.

THE DC-6A

The introduction of the DC-6A, largest, fastest cargo plane in operation today, enables American Airlines to offer customers next-morning delivery on east to west coast shipments. American, both pioneer and pace setter in the air freight field, has 3 DC-6A and 9 DC-4 Airfreighters at the service of shippers throughout the country.

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to the addressee is expedited or there is a savings in cost, as compared with the existing service."

▶ **Future Addition**—The three carriers previously participating in the program are Central Airlines, North Central Airlines and Frontier Airlines.

Piedmont Airlines is the only local service carrier that has not been included in the program. Post Office said it is "quite possible" that this airline will be included in the program in the near future, after study.

Over a brief experimental period during the Christmas rush last December, the 14 local service lines shipped surface mail. At that time, Civil Aeronautics Board urged the Post Office to continue the experiment for a year.

▶ **Expansion Studies**—Meanwhile, Post Office is working on studies looking to expansion of the surface mail-by-air program over trunk routes.

At rates of 18.66 cents and 20.04 cents a ton-mile, surface mail is now going by air on a space-available basis over four trunk routes: New York-Washington-Florida; Chicago-Florida; New York-Chicago, and Washington-Chicago.

There is concern in the industry that airmail will drop off sharply, as patrons learn the odds are high that three-cent mail will move by air.

CAA to Build Navaid Experimental Tower

Civil Aeronautics Administration and Air Navigation Development Board plan construction of a 200-ft. experimental tower, housing very-high-frequency omni-directional radio range, to determine if increased efficiency and coverage can be obtained by use of a tall facility.

It will be built in a heavily wooded area near Harrellsville, N. C.

Normally, VORs are housed on top of buildings 12 to 15 ft. high. In heavily wooded areas, it has been necessary to clear trees out to a radius of approximately 2,000 ft. to eliminate interference. This has proved costly and restricted the choice of sites.

Working Group to Aid Transport Review

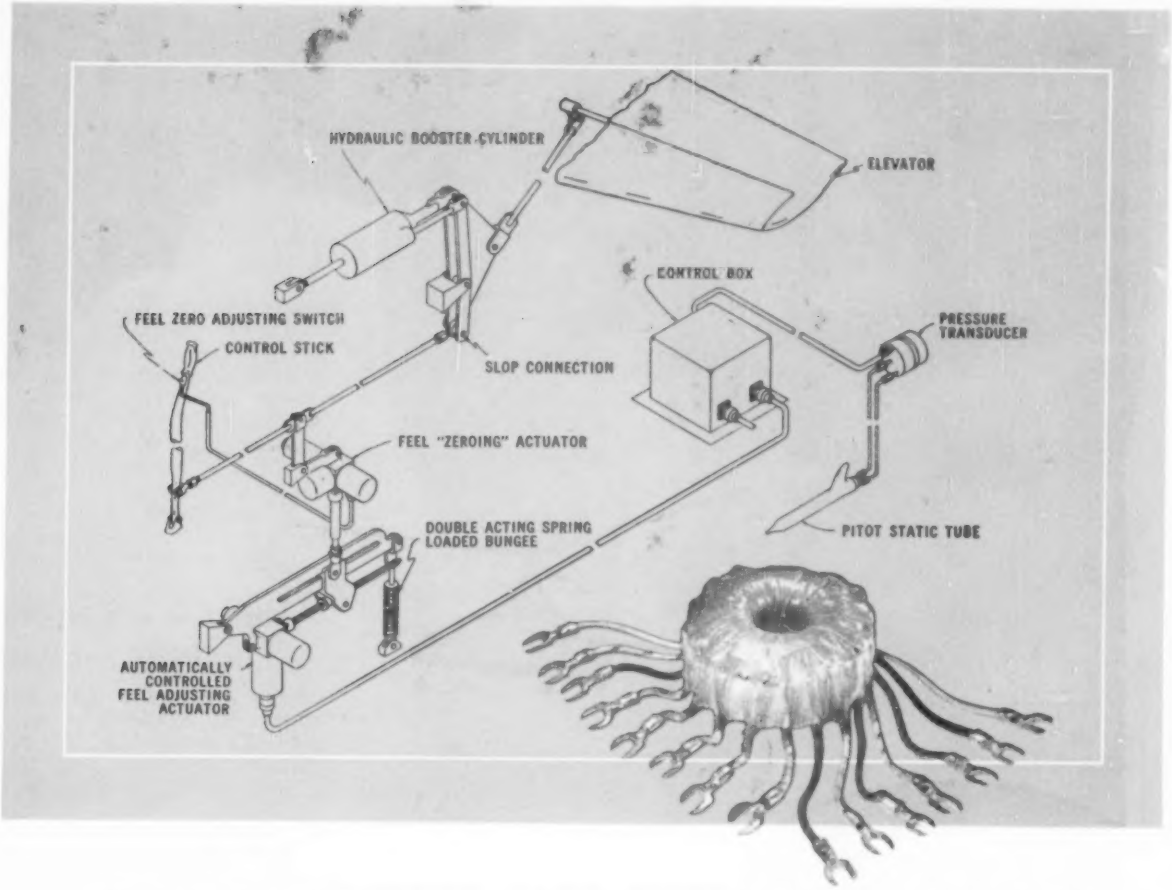
Secretary of Commerce Sinclair Weeks, chairman of the Cabinet Committee on Transport Policy and Organization, has appointed a working group to assist the committee in its review of national transport policy.

Directing the working group will be Arthur W. Page, a director of the American Telephone and Telegraph Co. Charles L. Dearing, who left his post as Deputy Undersecretary of Commerce for Transportation last month to return to the Brookings Institution, will serve with the group, along with five other traffic and transportation experts.

The President established the committee to overhaul the national transportation policy and to fit its various segments into a single comprehensive pattern. Such matters as the balance

Army Heliport Takes Shape

One of Army's seven activated helicopter companies will be based at Ft. Eustis, Va., late this year. It will use the first and only landing facility of its kind. The new heliport, shown under construction, will have hardstands, maintenance facilities and operations building for a unit of 29 cargo copters and two reconnaissance types. Personnel will include 129 officers and men. Completion is set for October.



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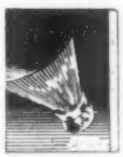

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of subsidy, user charges and taxes among the different transport media will be major factors in the study. A report is due Dec. 1.

Mohawk to Suspend One Copter Route

Mohawk Airlines has received permission from Civil Aeronautics Board to suspend its helicopter service between New York and Liberty-Monticello, N. Y.

The service has been in operation since last June and has been conducted without cost to the government. Mohawk found traffic between the points to be considerably less than had been forecast, and the operation has lost too much money to make the experiment feasible any longer.

There is no field at Liberty-Monticello that can handle Mohawk's DC-3s, so the Board says the line can suspend all service on that segment.

Private Plane Crash Fatalities Decline

Fatal crashes of private, executive and pleasure aircraft in 1953 claimed the lives of 585 persons, Civil Aeronautics Board reports. In 1952, 626 died in crashes of the same type aircraft.

Last year's accident total for private planes was the lowest in the postwar period, the Board says.

There were 2,886 accidents, excluding those in aerial crop control operations, of which 341 were fatal. In 1952, there were 352 fatal crashes out of a total of 3,281 accidents.

Philippine Nonskeds Win Route Rights

(McGraw-Hill World News)

Manila—Nonskeds will be able to parallel routes of scheduled airlines in the Philippines on days when the latter are not operating, according to a new ruling of the Civil Aeronautics Board.

The measure reverses a previous stand that nonskeds and charter operators could not serve points touched by Philippine Air Lines.

Air Traffic Boycott

(McGraw-Hill World News)

Amman, Jordan—Saudi Arabia and Iraq have decided to prevent any planes that land in Israel from landing at their airports, according to a note received here from the Arab Boycott Office.

Jordan is expected to do likewise.

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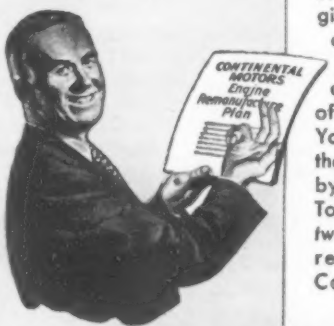

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Continental Motors Corporation
Aircraft Engine Division
MUSKEGON, MICHIGAN

MIG-15, MIKOYAN'S MOST FAMOUS FIGHTER, designed in collaboration with Mikhail Gurevich, is shown here in USAF markings after a defecting North Korean pilot delivered it to UN forces before the end of the war in Korea.

Mikoyan Analyzes Russian Design Trends

First official presentation of Russian aircraft design trends in recent years was made by top designer Artem I. Mikoyan in an article prepared for the Soviet publication Literary Gazette (June 19, 1954).

Co-designer of the MiG-15, for which he shared a Stalin Prize with structures specialist Mikhail Gurevich, Mikoyan ranks near the top of the Red hierarchy in aviation. That position has been emphasized further by his choice as current spokesman for the industry.

Presented here in a complete translation of the original Russian, Mikoyan's thoughts are larded with propaganda, occasional statements of doubtful veracity and saber-rattling. But they don't differ much in sum from the many generalized and "trend" presentations made by the executives and designers of the Western aircraft industry.

There is much to be read between the lines. A public utterance such as this one presents the Kremlin's—as well as the individual's—thoughts on policy. Thus, toward the end of the piece, Mikoyan officially refutes the often-heard stories that the Russians don't care about pilot safety and comfort.

Mikoyan's article appeared in the Gazette the day before the great air display at Moscow's Tushino airport. It was presented as a salute "To USSR Air Fleet Day" and bore the title, "On Great Speeds." This is the text:

When you think about the most characteristic feature of Soviet aviation as it approaches this Air Fleet Day, when you try to understand what above all distinguishes the contemporary airplane from the earlier one, the short, energetic word "speed" comes to mind at once. New speeds have appeared which seemed unattainable only a few years ago. This has become possible thanks to the fact that the airplane has again changed radically: Russian-built jet engines have replaced piston engines.

A new thing never rises without difficulty and it is not conquered without struggle. I well remember our first timid attempts, doubts and disputes. I remember quite recently when several designers expressed disbelief in the possibilities of jet aviation. It was thought that the new engine required colossal expenditure of fuel and, consequently, the duration and range of flight would be too limited. The jet airplane was considered unreliable, and flight in it was thought to be dangerous, far more dangerous than in ordinary aircraft.

Now all this is past. Jet aviation has won a convincing, universally recognized victory, not only in theory but also in practice. Reliability of the new engines has become generally acknowledged, and this is easy to explain: there are less working parts.

Mikoyan

Artem I. Mikoyan is one of the top Russian aircraft designers. From his mind and drawing board came much of the MiG-15, first-line Red jet fighter, for which he shared a Stalin Prize with structures specialist Mikhail Gurevich in 1947. Before that, the Mikoyan-Gurevich team collaborated on the MiG-9, twin-jet fighter developed hastily right after the end of World War II, and the MiG-1 and MiG-3 single-seat fighters.

He was born in 1899 in Armenia, child of a revolutionary schoolteacher. Trained as a draftsman, he worked on structural layout of airport buildings in his first acquaintance with aviation. Later he attended Superior Technical School in Moscow, majoring in aerodynamics.

Mikoyan holds many decorations; he is a Hero of Socialist Labor and ranked as a major general in 1949.

The jet airplane has turned out to be more convenient to operate than former machines and much cheaper to manufacture.

▶ **Power Increases**—In our time, before our eyes, a new, higher stage in aviation development has begun. In order to make clear what great qualitative progress this is, I will take one example.

The prewar fighter plane had an engine of around 1,000 to 2,000 hp. If you compare with this old measure the pull of a contemporary speedy airplane, you will get a figure on the order of 40,000 to 50,000 hp. The power of airplanes has risen tens of times.

▶ **Past Achievements**—On Aviation Day—the traditional day of reviewing the accomplishments of our country's glorious air fleet—we will never forget the past.

With gratitude we recall the name of M. V. Lomonosov who, for the first time, proved scientifically the principles of flight of bodies heavier than air, and A. F. Mozhaisky, who as early as 1882 built an airplane and conducted his flying experiments.

With pride we tell about the work of the creator of aerodynamics, N. Ye. Zhukovsky, rightfully called the father of Russian aviation, and about the wonderfully daring work of K. E. Tsiolkovsky, who as early as 1930 wrote: "The era of jet airplanes, or of stratosphere airplanes, must follow the era of propeller aircraft."

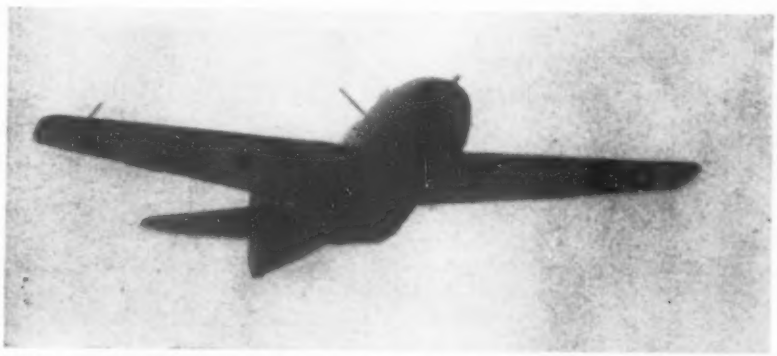
Great pride is also stirred by consciousness that the Soviet people not only preserve these scientific treasures but also increase them, continuing to develop science, continuing to move it still farther ahead.

The work of N. Ye. Zhukovsky served as the scientific basis for development of aviation throughout the world. And a large proportion of our present airplanes—those which plow the vastness of the air ocean of the nation, linking distant cities, those which make new discoveries in the Arctic, transport the sick, fight against agricultural pests, and aid in the study and protection of forest riches—all these airplanes, from takeoff to landing, completely submit to the laws of aerodynamics which N. Ye. Zhukovsky discovered.

We also will never forget that these very machines in the hands of bold Soviet pilots covered our aviation with unfading glory at the fronts during the Great Fatherland War [World War II].

But today I would like to talk about the newest of our achievements—about airplanes of the jet age which exceed the speed of sound. Beyond the sonic barrier absolutely everything changes, and classical aerodynamics are inapplicable to an important degree.

MIG-3 FIGHTER, earlier designated I-18, was development of first (MiG-1) design collaboration between Mikoyan and Gurevich. These planes were produced in great quantity and saw much service against the Germans on the Eastern front during World War II.



MIG-9 JET FIGHTER was one of two "first" Russian postwar jet designs. Hastily developed at the end of the war, the MiG-9 never got into production in any known quantity. The Mikoyan-Gurevich team jumped immediately to the initial design of the MiG-15.

▶ **The Shape Changes**—First of all, the very shape of the aircraft changes—undoubtedly everyone who has attended our aviation celebrations and parades has noticed this. The wings are modified: they seem to hug the fuselage, giving the aircraft an arrow-like look. This year spectators will see over Tushino aerodrome still more-arrowlike planes than those which were demonstrated in past years. The airplane is acquiring an arrow-like, triangular, rhombiform configuration.

[Ed. Note: This is the portion of Mikoyan's article that gave rise to the reports from Moscow that supersonic jet planes of rhomboid shape would appear at the display. This may have been a jump to a conclusion; Mikoyan's article is more conservative in tone and he may be only speaking in generalizations. The specific adjective used means either "rhombiform" or "diamond-shaped"; he did not use the adjective which means "rhomboid" or "rhomboidal."

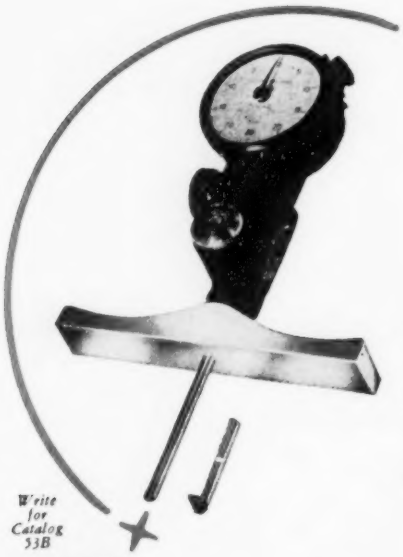
[To stretch a point, since the MiG-17s which appeared at the show were new to the Tushino display, and since they had more sweepback and were therefore "more-arrowlike," Mikoyan was right.]

There are appearing tail-less machines and duck-like planes on which the tail assembly is transferred to the front part of the fuselage.

There is nothing surprising either in the fact that the airplane can completely eliminate its wings. Wings have become less and less necessary for flight; they are required primarily for takeoff, maneuvering and landing. However, it is possible to solve the problem of takeoff comparatively easily: provide a catapult mounting or rocket.

But however much the airplane flies, sooner or later it must come to earth and, while going in to land, it is completely subject to the laws of classical aerodynamics. Here, for the time being, we can't in any way dispense with wings.

This is an astonishing development if you think about it. Formerly man dreamed about wings in order to fly, to tear himself from the earth. But now he needs wings mainly to return to earth. Examining pictures of the first airplanes of Mozhaisky and the



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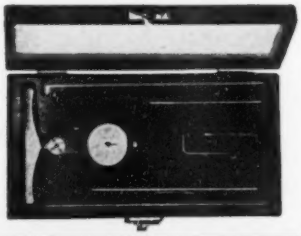

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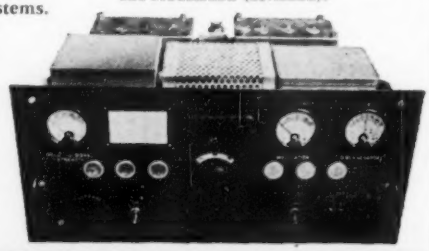

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Wright brothers, we see only boxes of planes—wings. At that time wings seemed to man the main appurtenance of the flying machine, the one which gave it resemblance to a bird. Now we no longer need to imitate the free flight of feathered creatures. [*Note: But a flapping-wing glider was one of the high spots of the display.*]

The power of the motor has grown so much, speed has increased so greatly, that the airplane receives lift not only and not so much from the wings as from the engine.

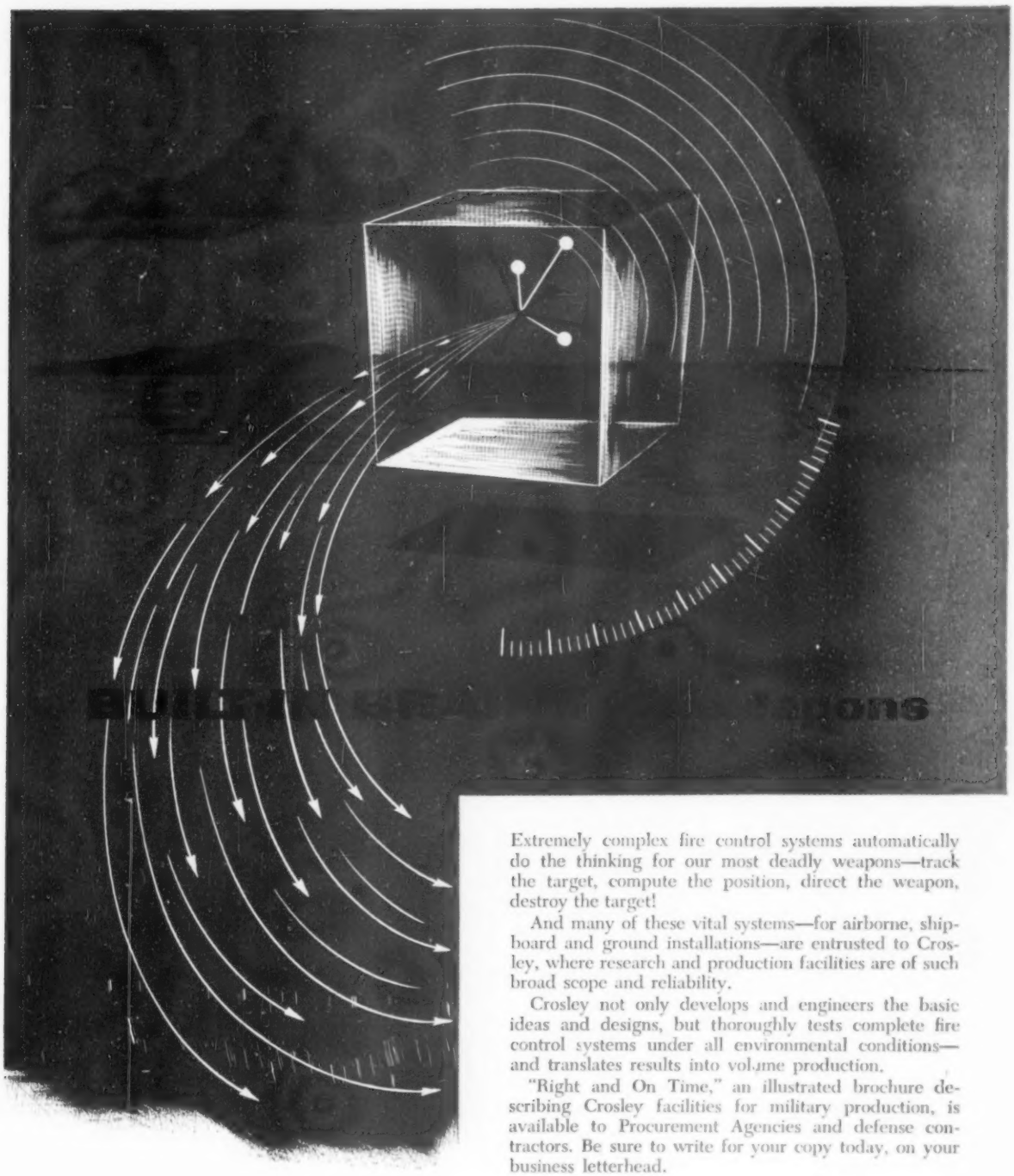
▶ **New Theories**—If all this is considered it will be clear than Soviet aviation theorists must follow the best traditions of Russian science not dogmatically but creatively. And it should be mentioned that our contemporaries have shown themselves to be worthy successors of the father of aviation. Personnel of the N. Ye. Zhukovsky Central Aero-Hydrodynamic Institute, by imaginatively developing the teachings of the father of Russian aviation, are successfully creating the theory of flight at supersonic speeds.

S. A. Khristianovich, V. V. Struminsky and other researchers have worked out and verified in laboratories the new aerodynamics of airplanes and have moved aviation science forward.

Even during the years of the first Five Year Plan (1928-1932) the Communist Party and all our people gave our falcons such advanced aircraft that Soviet flyers could fly farther, faster and higher than any others. It is with pride that we utter today the names V. Chkalov, M. Gromov, V. Grizodubova, P. Osipenko and other daring men who carried Soviet aviation to fame throughout the world. Our fliers were the first to blaze an air trail from Moscow across the North Pole to the United States. They make many heroic flights, established tens of international records, and glorified our fatherland as a great aviation power.

▶ **Round the World**—We keep a grateful memory of those times, and we see with pride that even today, in new conditions, the Soviet Air Fleet increases its fame. As before, our pilots fly farther, faster and higher than any others. During the years when Chkalov dreamed about a nonstop flight around the world, such a trip required many days.

But with present supersonic speeds they figure time a different way—such a flight would be measured in hours. Furthermore, the ceiling of aircraft has risen immeasurably. In the stratosphere, as is known, air resistance is considerably less, with the result that economy of flight has become significantly greater. In other words, with the very same quantity of fuel it is possible to fly much farther. Without dealing in fantasy, it is already possible to talk



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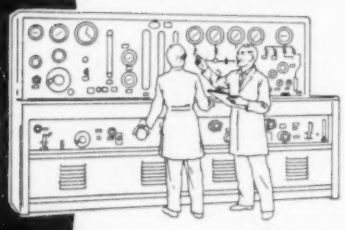

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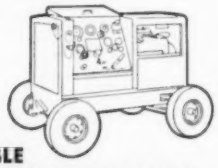

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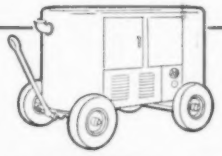

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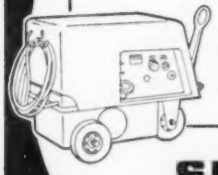

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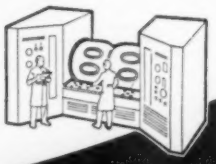

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about a nonstop flight in which the world is circled more than once. The earth has become smaller for modern aircraft.

▶ **Control is the Problem**—The principal worry of aviators now is not speed—it is possible to consider this problem as already solved. In former, but quite recent times, a new type of piston engine yielded an increase in speed of up to 50 kilometers per hour [31 mph.], and this was an excellent achievement. For jet airplanes this increase is calculated every year in hundreds of kilometers per hour.

Now the principal task of Soviet aviators has become the mastering to perfection of flights at the new speeds, to attain the greatest control of the airplane under the new aerodynamic conditions. And here it is necessary to mention with a good word Soviet pilots, navigators, flight mechanics and radio operators—the daring and talented winged breed.

The founder of scientific pilotage was, as is known, the Russian flier P. Nesterov. He was the first in the world to make a loop and developed the basis of acrial combat. Our best military pilots, such as three-times Hero of the Soviet Union A. Pokrishkin and I. Kozhvedub, won their amazing victories thanks to superior piloting skill in conjunction with courage and love for the fatherland.

Today speed pilots must indeed learn scientific pilotage anew. In the same way as our scientists must solve anew many aerodynamic questions, our flyers must again "discover" at supersonic speeds the Nesterov loop, snap rolls, turnovers and steep climbs. It seems quite recent, in August, 1947, that scientific pilotage in jet fighters was shown for the first time. And how the skill of our pilots has grown in the interim!

When the remarkable expert Valentin Lapshin makes a climb, shoots upward almost vertically and in fractions of a second is hidden in the clouds, even we designers each time are astonished at what our aircraft can do. That feeling doesn't leave us when the five-plane group of Alexander Babaev and the nine-plane group of Nikolai Shulzhenko perform in the air. The close formation flying of these pilots indeed surpasses everything that we have seen before. At the aerodrome they say that they fly "as if tied together," and, actually, the impression never leaves you that some sort of invisible threads link these planes which execute precisely the Nesterov loop, half-loops, turnovers, sharp climbs and snap rolls.

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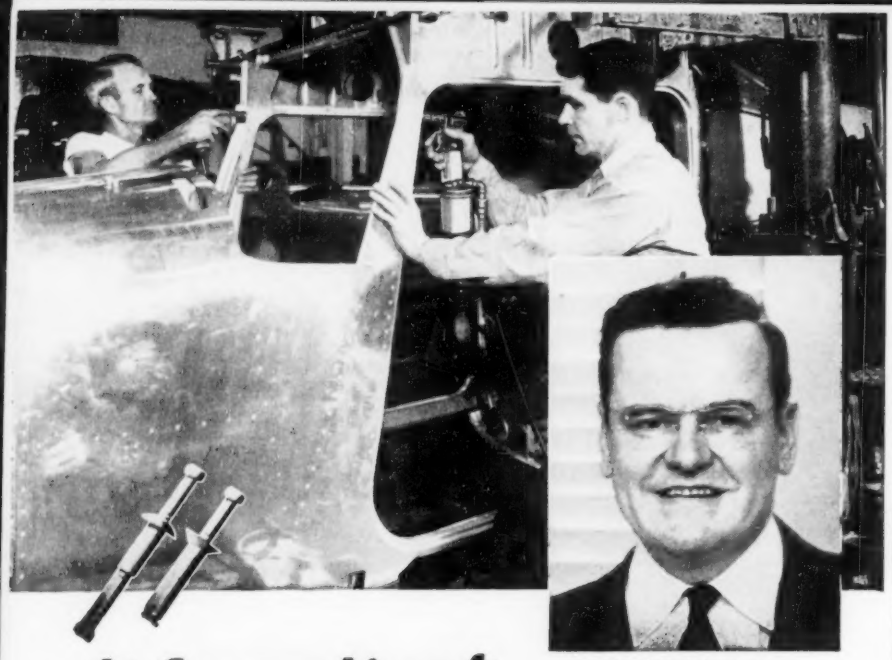

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▶ **Production Problems**—On Air Fleet Day, looking at the daring pilots who perform miracles in the sky, we also recall those who put the remarkable equipment in their hands—the aircraft industry workers. Creation of new, speedy airplanes was an important test for them, and they passed this test with honor.

But tens of complicated problems must be solved.

Wings of the new airplanes are considerably thinner than on earlier craft, and the wing loading has risen immeasurably. What precision and toughness is needed here! In the conditions of jet flight, protection of the pilot from sharp atmospheric and temperature fluctuations is also complicated. Finally, those gigantic loads which the airplane experiences during various evolutions would be too much for the pilots' physical strength to overcome.

Airplane builders must take all this into consideration. Special mechanisms assume the loads which the pilot himself sustained in older airplanes [*Note: Mikoyan may refer to G-suits*]. An airtight cockpit and air conditioning maintain the necessary regime in the cockpit, creating normal conditions in which the pilot can work. The problems of saving the pilot in cases where he must abandon the aircraft in the air are also being solved with the help of catapult seats. All this, I repeat, is very complicated; but protection of personnel has always been the first law of our aviation.

On this holiday one would like to talk about many things—to mention the work of many of our aviation designers, engineers, technicians and aviation plant workers, to thank our metallurgists who have given aviation new, super-tough alloys, machine builders who help us solve complicated problems of automatization of production, instrument makers, electricians, chemists and railroad workers who deliver equipment and new material to our factories without interruption. The entire nation, all of our mighty people, are helping strengthen the power of our Air Fleet. And in this fact is the main secret of all our achievements.

▶ **In Readiness**—Responding to its national responsibility, Soviet aviation—like all our armed forces—always guards and will vigilantly protect the peaceful,

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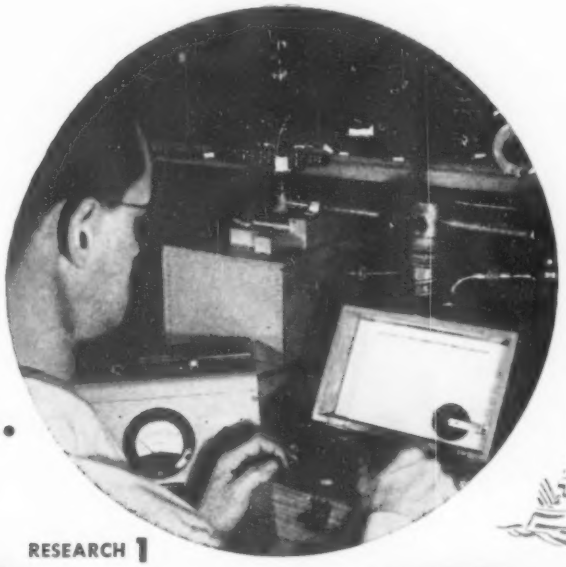

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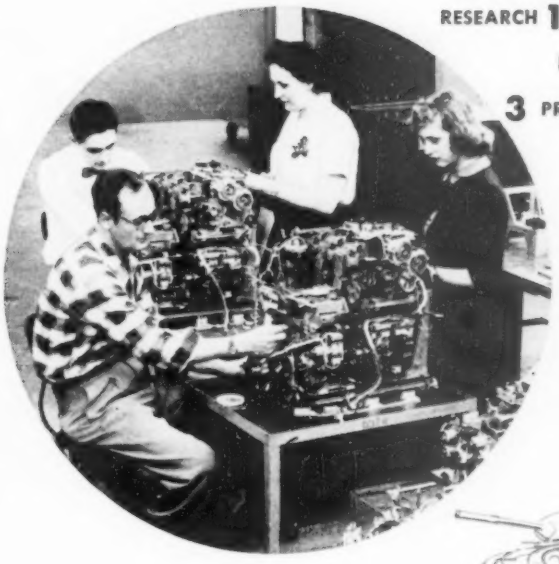

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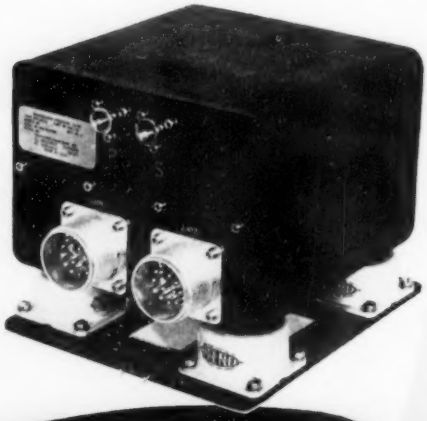

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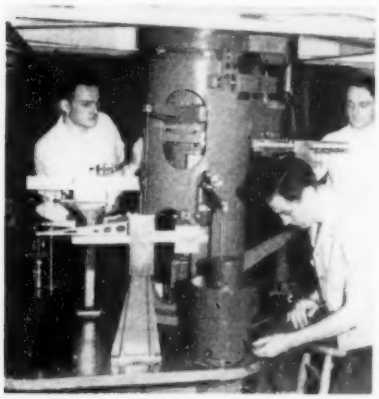
We want peace on earth and in the very name of peace and happiness of the people of our native land we will hold in readiness our terrible weapon.



CHANGES in U. of Washington windtunnel extend its utility in the industry.

Tunnel Test Time Offered to Industry

Seattle—The windtunnel of the University of Washington Aeronautical Laboratories has been modified to make it more versatile for industry use.

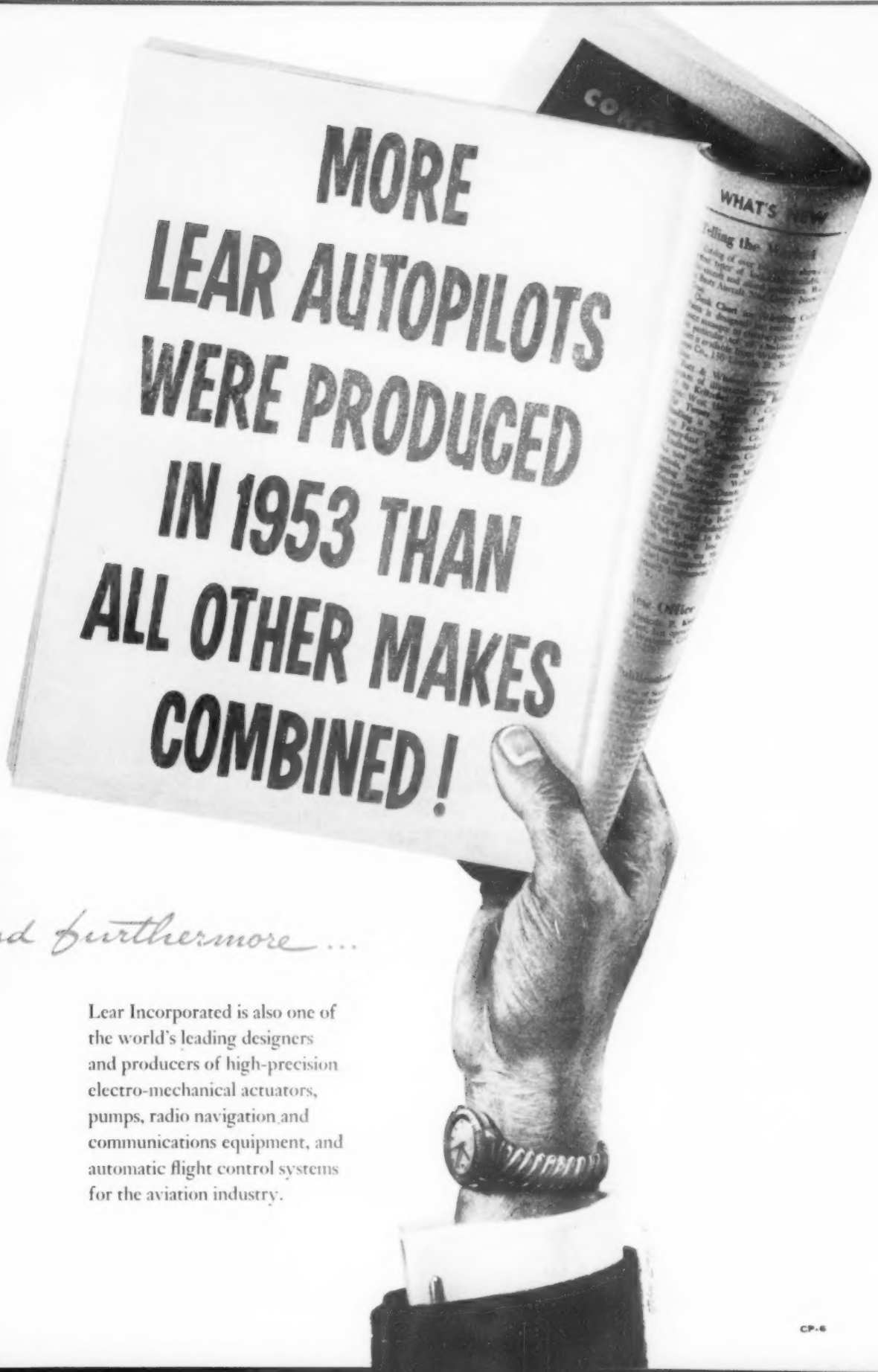
Test time is available to industry in the 8x12-ft., 250-mph. tunnel. The university has been doing windtunnel testing for the aircraft industry since 1939.

New balancing equipment in the tunnel allows the strut, which normally protrudes into the test section for mounting force models, to be removed, thus leaving the test section completely clear for special purpose testing.

"We are now in a much better position to do flutter testing, large panel testing, and two-dimensional testing," says Robert G. Joppa, supervisor of the aeronautical laboratories.

The new balance system was designed and built at the university at a cost of approximately $70,000. Boeing Airplane Co. contributed $20,000.

"At present our testing schedule is running approximately 80% occupancy and we are scheduling from one to three months in advance," Joppa reports.



and furthermore ...

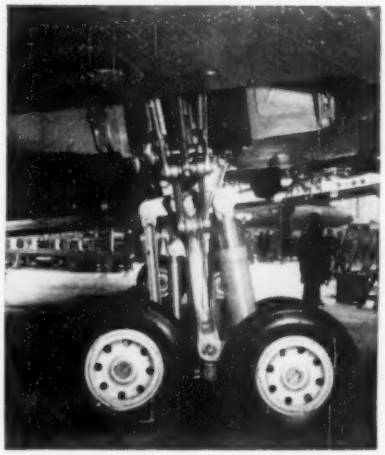
Lear Incorporated is also one of the world's leading designers and producers of high-precision electro-mechanical actuators, pumps, radio navigation and communications equipment, and automatic flight control systems for the aviation industry.

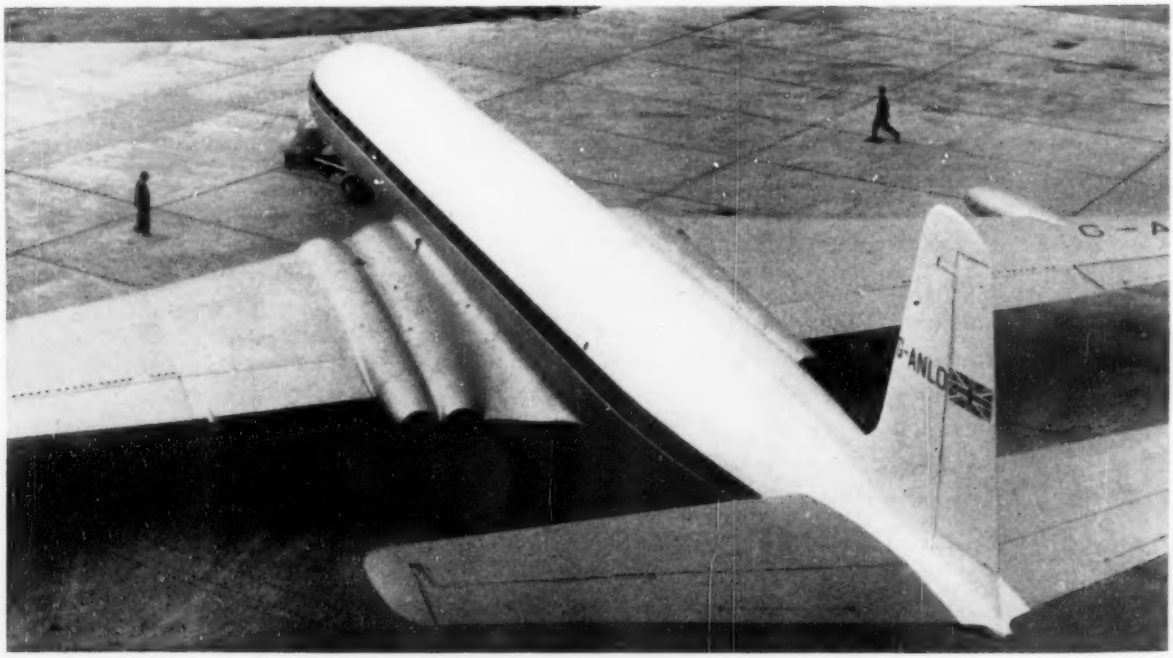
CP-6

Closeup Design Details of Britain's New Comet 3

Comet 3 closeups disclose design details of latest airliner in de Havilland jet transport series to fly. Plane is a development of Comet 1, 1A and 2.

- FUSELAGE, 15 ft. longer than the Series 2 version, accommodates 14 to 32 more passengers. Circular, instead of square cabin windows are installed.
- NACELLES enclose higher-power Rolls-Royce Avon 521s, first of the in-service jet engines to be rated officially at 10,000 lb. thrust, DH claims. Engines in the Comet 2 are Avon 503s, with about 7,000 lb. thrust.
- TAILPIPES are spaced farther from the fuselage and angled out more, apparently to lessen noise effects to the cabin.
- INTAKES for wing-buried engines top height of average man, thus avoiding danger of "suck-in" during ground operation of jets. Large underbay openings give easy access to engines from ground.
- FLAP AREA has been boosted considerably and surfaces now extend across the fuselage underbelly.
- WING AREA is larger, while same wing span has been retained.
- HORIZONTAL STABILIZER area also has been enlarged.
- AUXILIARY FUEL TANKS, one jetting from leading edge of each wing, will store approximately 1,400 gal. more than carried by the Comet 2.
- MAIN LANDING GEAR, similar to that used on the earlier Comets, has been beefed up considerably, uses a large single-piece forging for the main leg. Dunlop Maxaret hydraulic nonskid brakes are installed. Dunlop dimpled tires further enhance stopping ability.





Facts about *HELICOIL* inserts in the aircraft industry

What they are

*Heli-Coil** screw thread inserts are precision-formed coils of stainless steel or phosphor bronze wire. Wound into tapped holes, they form permanent non-corrosive, strip-proof threads of astonishing strength.

How they cut weight

Threads tapped in aluminum or magnesium when protected by *Heli-Coil* inserts are much stronger, therefore you can use smaller, fewer, shorter cap screws for required strength. Fewer or shorter cap screws mean savings in fastening-weight, through lighter bosses, thinner flanges, and thinner wall sections.

What they are for

AS ORIGINAL COMPONENTS: *Heli-Coil* inserts are used to provide stronger, lighter fastenings, corrosion-proof, wear-proof, threads in all assemblies. Thus you find *Heli-Coil* inserts throughout aircraft engines, airframes, and accessories, from the heart of jet engines to skin inspection panels.

FOR PRODUCTION SALVAGE: When conventional tapped holes are damaged in production, restore them on the line with *Heli-Coil* inserts. Get better-than-original strength with no increase in screw size and no tell-tale signs of re-work.

FOR SPEEDY REPAIRS: When tapped threads are fouled up by wear, stripping, or corrosion in service, renew them in minutes on location in shop or field with *Heli-Coil* inserts.

No welding—no plugging—no secondary machining—no oversize screws.

For useful tips, use the coupon for free subscriptions to *"Heli-Coil"* in which we publish latest news on what others are doing in your field.

How they work

Holes are drilled and tapped as you do for ordinary threads—then *Heli-Coil* inserts are wound into tapped holes by hand or power tools. Install in a few seconds, assure thread protection forever. Can be used in any metal, wood or plastic.

No other method is so simple, effective and practical.

Heli-Coil inserts improve the end product, cut rejects, salvage threading errors.

All sizes and types

Available for National Coarse, National Fine and Unified threads, pipe threads and spark plug threads. They are made in all standard sizes and lengths for assemblies requiring Class 3, 3B, 2 or 2B fits.

Best time to put *Heli-Coil* inserts benefits to your use is right at the designing board, as many leading manufacturers are doing. But to convince you of their many advantages ask for a working demonstration right on your production line. Write today! Complete information and engineering data is available in the *Heli-Coil* catalog. Use coupon!

*Reg. U. S. Pat. Off.

Approved for All Military and Industrial Uses

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Here's how *Heli-Coil* Wire Inserts help you gain *strength*—They're flexible . . . distribute stresses over the full length of engagement. They're tough and accurate. You eliminate stripping, wear, cross-threading and corrosion in aluminum, magnesium and other metals. Equally useful in wood and plastics.

Here's how they help you shed *weight*—Because they are strong, you can use fewer or smaller fastenings. Because they end the need for solid bushings you can use smaller bosses and flanges.

HERE'S PROOF

Look at these facts—examples of the aircraft industry's growing acceptance of *Heli-Coil* Inserts:

General Electric has jumped the use of *Heli-Coil* Inserts 4 to 5 times in the J73 over the J47. In the forward frame alone the number has climbed from approximately 50 to 306.

Pratt and Whitney pioneered the use of *Heli-Coil* Inserts in spark plug openings in reciprocating engines. Today they are the largest user for this purpose.

Call in your *Heli-Coil* engineering representative for a discussion of how you can gain strength, reduce product weight, and cut costs with easy-to-use *Heli-Coil* Inserts in airframes, engines and component parts.

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Push-Button to Drop C-130 Cargo Loads

Vehicle and supply loads of up to 20 tons can be parachuted from cargo planes in matter of seconds by a push-button system developed by Lockheed Aircraft Corp., Marietta, Ga.

The method was developed especially for the company's new four-engine C-130A turboprop transport, which the Marietta Division will produce for USAF.

Although engineered for the C-130A, the device can be fitted to other cargo plane types, the company says. Preliminary tests with the gear have been made on a Fairchild C-119 Packet.

The system uses two aluminum alloy platforms 9 x 24 ft. and 9 x 15 ft. with a gross load capacity of 25,000 lb. and 15,000 lb., respectively. The cargo is loaded and fastened to the platforms and put aboard the C-130A by roller conveyors.

Pushing a button in the cockpit releases the platforms and an extraction parachute that drags the loaded platform out of the rear of the plane. After the cargo pallets clear the ship, an automatic mechanism opens large cargo chutes. The second platform follows the first in a matter of seconds.

Lockheed engineers developed shock absorbers to cushion the platforms' impact on landing. Other devices prevent the cargo-laden pallet from upsetting due to rough terrain or surface-wind drift. Platforms and chutes are re-usable, Lockheed reports.

Shop on Wheels

It takes only 25 min. to position and "button up" this mobile maintenance shelter by a B-29, B-50 or C-97 aircraft, enabling personnel to handle work while protected from inclement weather and reducing need for valuable hangar space. Luria Engineering Co., Bethlehem, Pa., is building 100 of these low-cost steel shelters for USAF. Special canvas curtains and resilient pads provide tight closure. Dimensions: 18 x 15 x 25 ft. Power sources and lights are fitted.

INDIVIDUAL SEATING in the new AERO Commander 560

Reclining individual chairs adjust fore and aft providing maximum personal comfort for the occupant.

Individual Seating

is one of the many comfort advantages in the new Aero Commander 560.

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WRITE DEPT. 128 FOR NEW CATALOGUE

AERO DESIGN Commander 560

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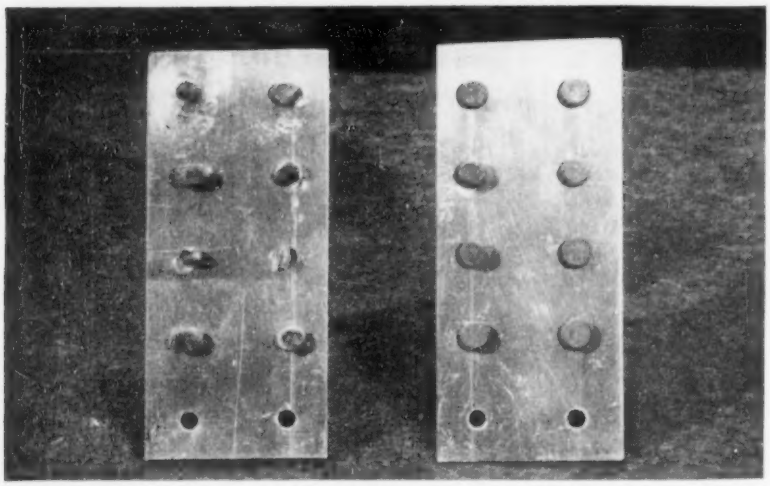


TITANIUM RIVETS driven cold (left) and those installed with resistance-heat method at Martin. Cold-driven units have split and cracked heads, and excessive pressure required also caused sheets to buckle. High-quality results were obtained with the heated rivets.

How Martin Drives Titanium Rivets

Titanium rivets are now being driven successfully at the Glenn L. Martin Co. Both portable and stationary production riveting equipment is being used.

This development is a result of the company's continuing research into the production potential of titanium in airframe construction.

Previously, titanium assemblies had been riveted with Monel or stainless steel rivets. In one Martin aircraft design which has more than 500 details made of titanium, the loss in benefits would be considerable if a less-desirable material (heavier or less heat-resistant) were used for the rivets.

Information on Martin's titanium rivet investigations has been supplied to AVIATION WEEK by Paul Kline and Jack U. Mowll of the company's manufacturing research and development unit.

▶ **Resistance Heating**—Martin studies of titanium in dimpling and hot-forming operations demonstrated that the metal becomes plastic at moderately high temperatures. Also, it was found that resistance heating (AVIATION WEEK Apr. 12, p. 30) was the most practical method for heating titanium, because it provides precise temperature control and prevents contamination and embrittlement associated with other means of heating.

Putting these two principles together, it was a logical step to combine standard resistance heating equipment, normally used for installing explosive rivets, and standard portable and stationary riveting machines.

▶ **How It Developed**—When the need for titanium rivets first arose in Martin manufacturing, standard methods of driving rivets cold were found impractical. The cold fasteners cracked, split and the heads shattered—some 60-70% were failures.

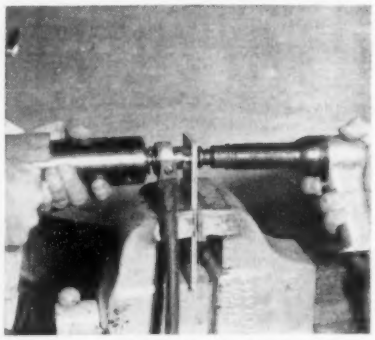
For heated units, manufacturing research engineers first tried a hot- dimpling machine which heated the rivets by conduction. Too slow for production work, the procedure nevertheless indicated the proper solution.

Trials were next made on a three-phase 400-kva. spotwelding machine. This showed that resistance heating was satisfactory, but the rapid cycle of the machine did not heat the rivets completely. Rivets did not fill the holes properly, they had shear cracks and largely were unacceptable.

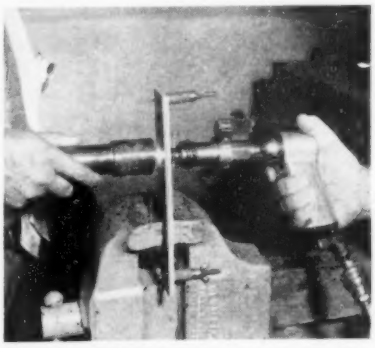
Success was achieved when a special control circuit was devised for combining the resistance heating equipment, usually used for firing explosive rivets, and a standard stationary riveting machine. The timing cycle automatically applies seating pressure, heating current, cuts off the current when proper riveting temperature is reached, then applies full riveting pressure. Uniformly perfect rivets are produced.

▶ **Hand Gun Use**—When used with portable riveting equipment, the resistance unit is connected to the riveting gun and the bucking bar. The rivet is the resistor in the circuit. When the rivet is heated red hot, the riveting impulses are applied. This is a simple technique that requires no elaborate equipment, no complicated controls, and it produces uniformly high quality results.

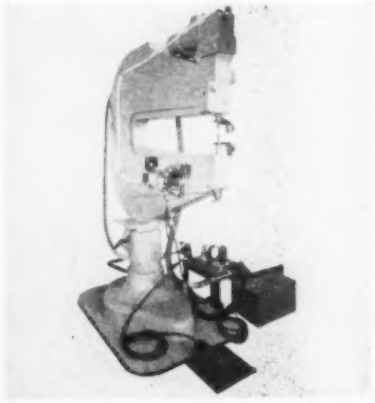
A variation of this scheme permits the electrical connections to be located



PORTABLE RIVETING equipment rigged for heating titanium rivets before driving.



SPECIAL BUCKING BAR used for heating rivets. Current flows thru bar center to rivet, out thru sheet, to insulated clamp, back to transformer. This method allows electrical connections to be on one side of sheet when working large assemblies.



CHICAGO Pneumatic CP-450 riveting machine adapted for resistance-heat method for driving titanium rivets. Transformer is at right; automatic time and temperature controls are mounted at left.

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"The 100 cu. in. production unit weighs only 4.2 lbs. and the 200 only 8.8 lbs. Other sizes will soon follow.

"For any application where you need stored high-pressure gas . . . pneumatic systems, emergency systems, purging, or the like, why not use these new Parker units?

"For hydraulic systems, Parker's accumulators have been proved in over two years' service.

"The balanced inner-cylinder carries the piston and seal. Air pressure is applied equally to both sides of the inner-cylinder wall. Thus, the piston moves in a cylinder that always stays exactly the same diameter over its entire length. There can be no breathing to cause excessive O-ring wear. Leakage is practically eliminated.

"Parker accumulators meet *all* of the requirements of Specification MIL-A-5498, *Revision B.* All standard sizes are now in production."

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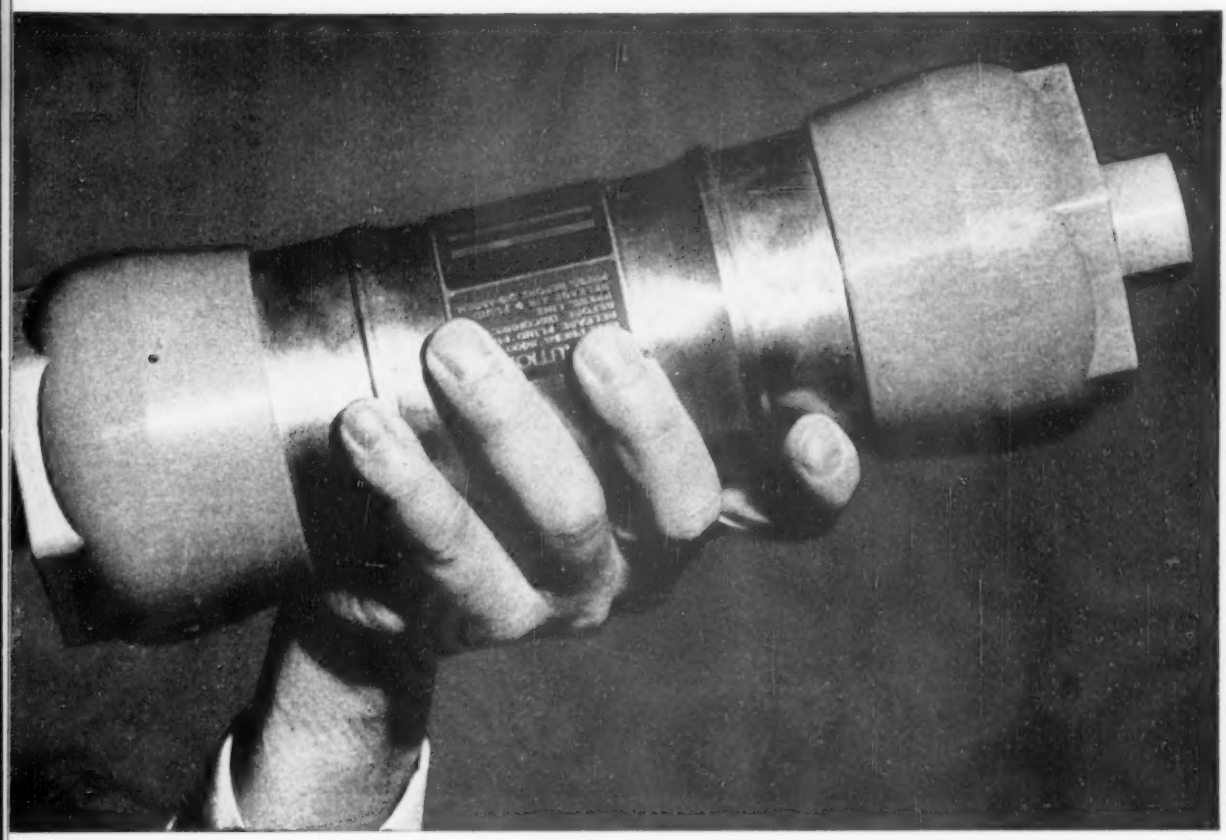

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☐ Parker aircraft hydraulic accumulator Catalog, File No. 1356

☐ Information about these other specific aircraft fuel or hydraulic products:_____

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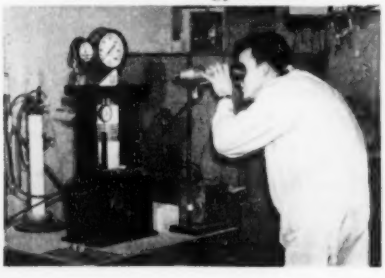
RESEARCH AND DEVELOPMENT at Solar are an integral part of every production job. Every product, whether it is a prototype or one that has been in standard production for years, benefits from Solar's continuous research program. Processes, methods, tooling, as well as product designs, are continually and systematically examined by Solar engineers.

Powder metallurgy research



Integrated study programs at Solar have ranged from pioneer afterburner research and the development of small gas turbines to the volume production of small aircraft bellows. These Solar projects have assisted many companies to improve their products in important ways as well as to reduce costs substantially.

Solar's continuous research program benefits every Solar customer. Whether you order a special experimental unit or quantity production of a standard part, you are assured of the most advanced design and fabricating skills.

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Solar specializes in the manufacture of precision products from alloys and special metals for severe service. Solar's experience since 1927 is unduplicated in this field. Solar skills and facilities range from research, design and development through to mass production. Wherever heat, corrosion or difficult specifications are problems, Solar can help you solve them.

PLANTS. *In San Diego and Des Moines (photograph above). A total of 1,400,000 sq. ft. of floor space. Approximately 5,000 employees. Annual sales over $65,000,000.*

EQUIPMENT. *Production equipment for all types of metal fabrication —forming, machining, welding, brazing, casting, coating. Extensive laboratory and testing equipment. Facilities for development, prototype, limited or mass production.*

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Current orders include aircraft engine and airframe parts, alloy castings, pneumatic ducting, atomic energy components. Customers include some of the most honored names among aircraft and industrial companies in the U.S. and Europe.

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Ceramic Coatings. *"Solaramic"® is the Solar trade mark for a family of coatings that protects metals from heat, corrosion, galling and abrasion.*

Controls. *Complete control systems utilizing the new Solar "Microjet"® principle for control of gas turbines, jet engines and pneumatic devices.*

FURTHER INFORMATION
Your inquiry regarding any Solar service or facility will receive prompt attention. Address Solar Aircraft Company, Department A-23, San Diego 12, California.

on only one side of the sheet for convenience in assembling large aircraft structural units. A special bucking bar is used, through the center of which the current flows to the rivet, out through the sheet to an insulated, spring-loaded clamp on the bucking bar, and back to the transformer through a lead attached to the clamp.

Martin has contrived an arrangement for portable riveting gun use so that the operator does not have to wait until he sees the rivet get red hot before driving. Equipment involves a transformer, with controls for automatically timing the heating cycle to provide precise heat for softening the rivet before impulses are applied. A Variac unit provides quick adjustment to accommodate different sizes of rivets and material.

PRODUCTION BRIEFING

▶ **Dallas Airmotive, Inc.**, Tex., has received a U.S. Coast Guard contract to overhaul P&WA R1340-57 engines used on the service's Sikorsky HRS copters. Contract will be in effect until June 30, 1955.

▶ **Northrop Aircraft, Inc.**, Hawthorne, Calif., has won a National Safety Council honor plaque for its 1953 occupational safety record, given only to firms completing 3 million continuous manhours without a disabling injury during the year. This is the second consecutive year Northrop has won the award.

▶ **Huck Manufacturing Co.**, Detroit, Mich., has appointed Turney & Beale, Bayside, N. Y., as East Coast distributors and California Rivet Co., Glendale, as West Coast distributors of Huck self-plugging, pull-through and Deutsch commercial drive-pin blind rivets.

▶ **Bigelow-Sanford Carpet Co., Inc.'s** Fiber Glass Products Division has opened sales and technical service offices at 243 West Congress St., Detroit 26, Mich., headed by William J. Egensperger.

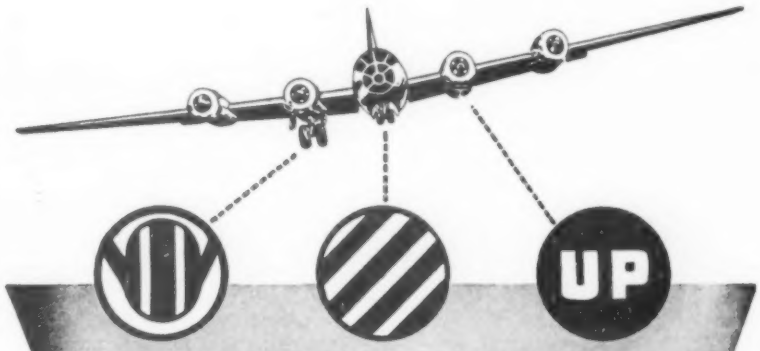
▶ **Aerodex, Inc.**, Miami, Fla., has received the first 15 of an undisclosed quantity of North American T-6 trainers for overhaul before flyaway to Dominican Republic. The firm notes that it can furnish flight manuals to permit a 1,000-lb. gross weight increase on all Lockheed Lodestars using Wright R1820-56, -66 and -72 engines with either 23E50/6339 or 33D50/6511 props.

▶ **Missile Research Manufacturing Corp.**, Van Nuys, Calif., has designed a cam grinding machine utilizing mathematical formulas and based on a one-to-one ratio that permit an operator to maintain these tolerances: ± .0002-in. on offsets and ± 0-deg., 0-min. 05 sec. on angularity. The firm also is making precision instruments for inspecting cams in service, employing a master cam and said to reveal precise amount and point-of-fault in minutes instead of hours previously required.

▶ **Enamel & Heating Products, Ltd.**, Sackville, New Brunswick, has been designated co-major subcontractor with Canadian Car & Foundry, Ft. William, Ont., on Grumman S2F twin-engine anti-sub planes being built by de Havilland Aircraft-Canada. E&H will make complete tail assemblies, CC&F the wings, DH the fuselage. E&H will increase its Amherst, N. S., employment to 300.

▶ **United-Carr Fastener Corp.**, Cambridge, Mass., has acquired all capital stock of the Palnut Co., Irvington, N. J., on a share-for-share basis. Palnut makes single-thread lock-nuts of spring-tempered steel. The company will be operated as a United-Carr subsidiary and retain its present management.

▶ **Cessna Aircraft Co.**, Wichita, has boxed its 1,000th L-19 Bird Dog liaison plane for overseas shipment.



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ARDC Contracts

The following contracts have been announced recently by Headquarters, Air Research and Development Command, Baltimore 3, Md.

• **CORNELL AERONAUTICAL LABORATORY, INC.**, Buffalo, N. Y., long-range analytical studies of weapons system, $242,425.

• **JOHNS HOPKINS UNIVERSITY**, Baltimore, Md., research on combustion rates in fuel-aerosol vapor mixtures, $32,322.

• **PROPULSION RESEARCH CORP.**, Santa Monica, California, theoretical and experimental supersonic flow studies related to turbomachine design, $61,381.

• **STANFORD RESEARCH INSTITUTE**, Stanford, Calif., long-range analytical studies of weapons systems, $27,000.

• **INSTITUTE of ANDEAN BIOLOGY**, Lima, Peru, research and reports on "Mechanisms of Natural Acclimatization to High Altitudes," $162,898.

• **UNIVERSITY of ARKANSAS**, Fayetteville, Ark., research and reports on "High Temperature Chemistry of Fused Substances," $30,150.

• **CARNEGIE INSTITUTE OF TECHNOLOGY**, Pittsburgh 13, Pa., research and reports on conformal and variational methods, $75,380.

• **WASHINGTON UNIVERSITY**, St. Louis, Mo., continuation and extension of research in nuclear reaction studies, $46,085.

BuAer Contracts

The following contract awards of $25,000 and more have been announced recently by the Bureau of Aeronautics, Department of the Navy, Washington 25, D. C.

ALL AMERICAN ENGINEERING CO., Wilmington, Del., conduct dynamic tests to determine performance and operational reliability of a pop-up barrier, $64,863; kits for ZP3K airships, 39 ea., $108,080.

MOTOROLA, INC., Phoenix, Ariz., power supply drawings, 169 ea., $59,403.

PATHESCOPE CO. OF AMERICA, INC., New York 26, master shooting scripts with partial storyboard for motion picture training films on the subject "First Aid for Fractures," 5 ea., $28,032.

SANDERS ASSOCIATES, INC., Nashua, N. H., helicopter doppler navigator, drawings, 5 ea., $475,205.

SAWYER BAILEY CORP., Buffalo, N. Y., Model A-19 air turbine starters, blueprints, etc., 132 ea., $198,569.

SCAFFOLD EQUIPMENT CO., Pittsburgh, P5M engine workstands, drawings, kits and handbooks, 40 ea., $66,268.

SPERRY CORP., Great Neck, L. I., N. Y., Model 537 frequency meter, handbooks, spare parts, 300 ea., $143,621; radar test sets, handbooks, spare parts, 7 ea., $222,051.

STANFORD RESEARCH INSTITUTE, Stanford, Calif., report on the manufacturing potential of manufacturings of airframe and guided missiles for BuAer, $39,750.

TEXAS INSTRUMENTS INC., Dallas, Tex., sample of cable detecting and fault locating equipment reports, 1 ea., $62,585.

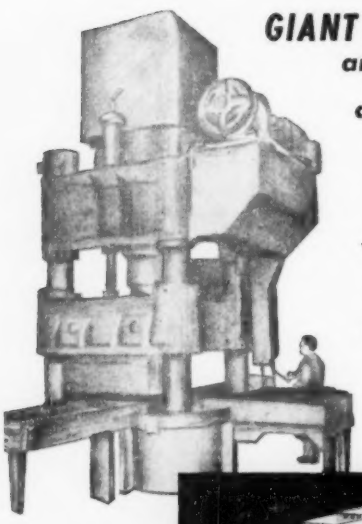
TRANSITRON, INC., New York, model sweep signal generators drawings, 152 ea., $544,587.

WESTINGHOUSE ELECTRIC CO., Washington, D. C., rectifier converters, 200-ampere, 10 ea., $27,500.

WILDING PICTURE PRODUCTION, INC., Chicago, preparation of training films on "Amphibious Operation," $170,026.

UNITED STATES RUBBER CO., New York, acquisition, rehabilitation where necessary and installation in the contractor's plant at Passaic, N. J., of machine tools and other capital equipment required to equip said plant for the production of cable fairings, $99,956.

ECLIPSE-PIONEER DIV., Bendix Aviation Corp., Teterboro, N. J., oxygen regulators, 1,200 ea., $229,200.

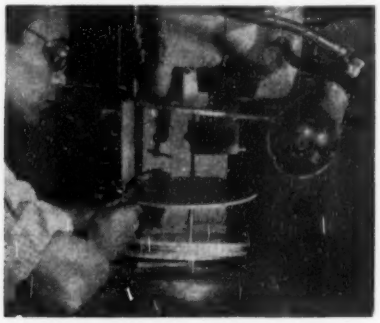


GIANT PRESSES
and tiny tubes . . .
all a part of Kaman

The production of Kaman helicopters requires large plant facilities, an impressive inventory of machine tools and equipment . . . and men. From technical men devoted to the research, design and development of aerodynamic, mechanical, electronic, and electro-mechanical devices and systems to production craftsmen skilled in the art of metal working. All are part of Kaman, and each helps explain the universal acceptance of Kaman Performance. Booklet on request.

KAMAN

THE KAMAN AIRCRAFT CORPORATION • BLOOMFIELD, CONN.



Internal Cutter

A simple scheme saving valuable shop time at Boeing-Seattle is metal post slotted to accommodate the blade on a Do-All saw used for internal cuts. Formerly the blade had to be broken, inserted in the drilled hole in the part, then welded before the sawing could begin, broken again to permit removal. Now, the metal post with the slot in it to contain the blade is attached to a bracket fastened to the saw table. As many as 12 parts to be sawed may be stacked over the post for internal cutouts on each part, one at a time, before the blade has to be broken again.

FOR COMPLETE AVIATION RADIO SYSTEMS

...look to the leader

AIRCRAFT NAVIGATION AND

VOR / ILS

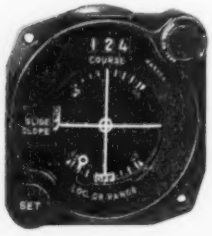
Complete use of every present VHF navigational facility . . . using only one indicator.

Below on the left you see the famous Bendix Omni-mag. It's a 4-in-one indicator . . . VOR, ILS, magnetic heading and marker. The new MN-85 Navigational system provides tone localizer (ILS) Visual Omni Range (VOR) Visual-Aural Range (VAR) and communication reception on 280 crystal controlled channels.

The new Bendix 20-channel Glide Slope Receiver provides the final link for complete ILS operation.

When used with Bendix VOR equipment, both localizer and glide slope information is shown on a single indicator.

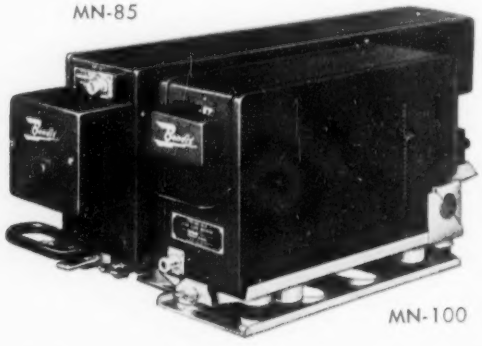
A single finger-tip control provides simultaneous selection of VOR and ILS channels.



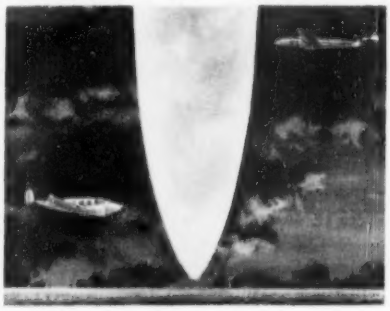
OMNI-MAG

MN-97

MN-85



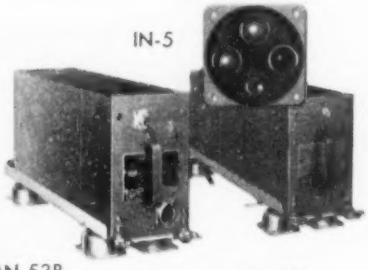
MN-100



MARKER BEACON

The Bendix 3-light system is the standard on all U.S. airlines. Accurate . . . simple . . . trouble free. High and low sensitivity settings. No relays. No contacts to wear out.

IN-5



MN-53B

MN-61B

DME

Distance Measuring Equipment electronically computes distance of an aircraft from a combined DME/VOR station.

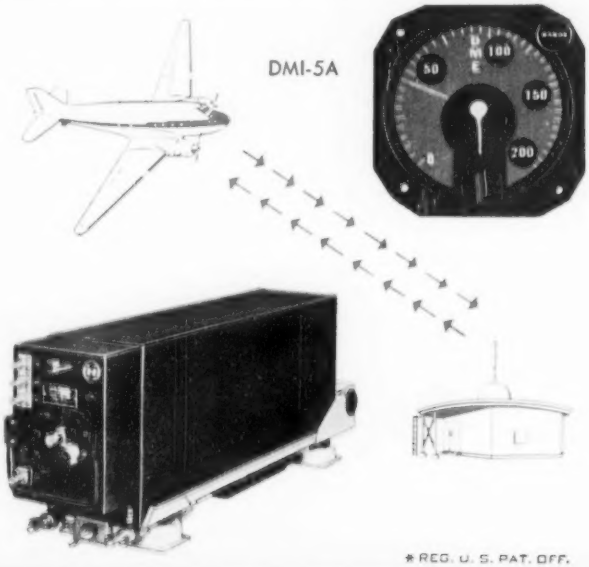
In the Bendix DME system, the distance is shown directly in miles on an easily read, full faced indicator. The indicator can be set from 0 to 40 or from 0 to 200 miles.

It is now possible with the Bendix system to fly coast to coast, from Canada to Mexico on fully commissioned DME ground stations. With DME more accurate ETA's can be established . . . unmarked airways can be flown . . . instrument approaches can be made to infrequently used fields under IFR conditions.

THE DME ANTENNA

ANT - 5 A

DME 5A



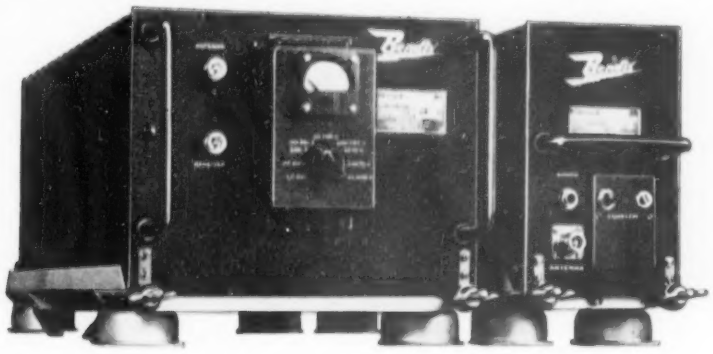
DMI-5A

* REG. U. S. PAT. OFF.

Bendix Radio

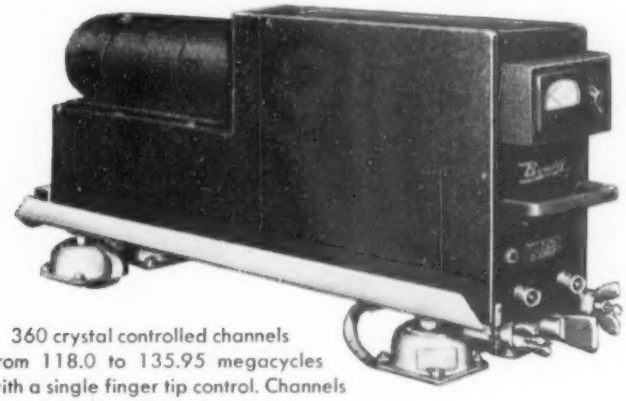
DIVISION OF BENDIX AVIATION CORPORATION
BALTIMORE 4, MARYLAND, U. S. A.

COMMUNICATION SYSTEMS



TA-18BB RA-18C

VHF COMMUNICATIONS



TA-20

360 crystal controlled channels from 118.0 to 135.95 megacycles with a single finger tip control. Channels can be selected in three seconds.

50 kilocycle channel spacing provides maximum use of available channels. Eliminates possibility of obsolescence for years to come.

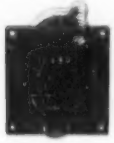
The TA-18 transmitter power output is 35 watts nominal. The TA-20 (½ ATR) provides 25 watts output. Conservative design results in long, trouble free operation.

Receiver weighs only 17.5 pounds, less power supply.

A tuning meter and switch on the front panel of the transmitters permit instant checking of major circuits.

CONTROL PANEL

Single Bendix control panel used to select transmitter and receiver channels simultaneously. The DA-NITE panel provides white numerals during day... red numerals at night.

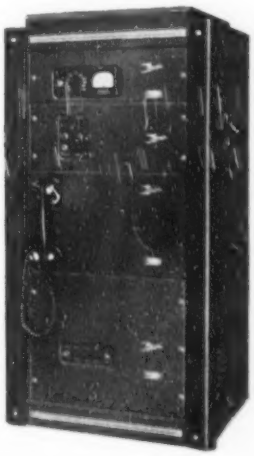


SEL-18

VHF GROUND STATION

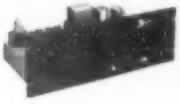
An economical, fixed station single channel transmitter and receiver for ground to air and from point to point service. Transmitter provides 50 watts output from 108.0 to 135.95 mc.

Transmitter or receiver is available separately for installation in existing systems.

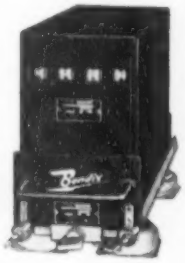


SELECTIVE CALLING

The Bendix SELCAL system is designed to provide the pilot with visual or aural notification of incoming radio calls. Over 1400 interference free tone combinations... pre-selected frequencies. Airborne and ground equipment. Permits pilot to fly long hours without wearing headphones or to monitor both ATC and his company channel simultaneously.



OSC - 3 A



SCL - 3 A

WEST COAST SALES
Bendix Radio
10500 Magnolia Blvd.
North Hollywood, Calif.

SOUTHWEST SALES
Bendix Radio
3300 Love Field Drive
Dallas 9, Texas

EXPORT SALES
Bendix International
205 E. 42nd Street
New York 17, N. Y.

CANADA
Aviation Electric Ltd.
200 Laurentien Blvd.
Montreal P.Q., Canada

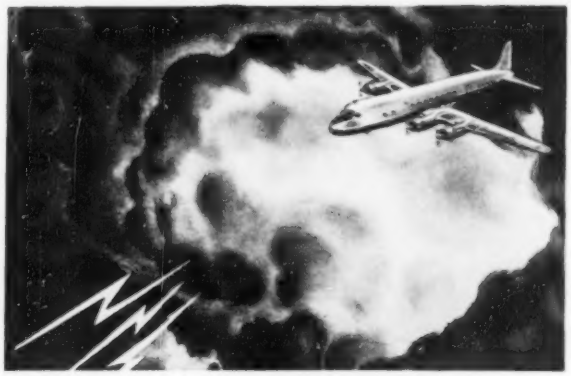
. . . and now Bendix AIRBORNE RADAR

The Bendix RDR-1 Airborne Radar System has been developed to provide commercial and executive aircraft with a practical and dependable means to evaluate weather conditions.

The RDR-1 Radar System also has provision for radar beacon navigation and terrain mapping. It has a maximum range of 150 miles.

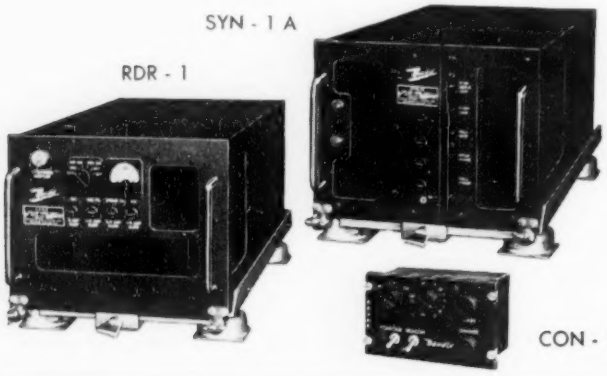
Iso—echo circuitry enables pilots to determine the exact center of approaching turbulent areas. Small angular course deviation will enable pilot to traverse storm areas with a minimum of turbulance thus preventing damage to ships and increasing passenger comfort.

The entire system weighs less than 150 pounds.



SYN - 1 A

RDR - 1



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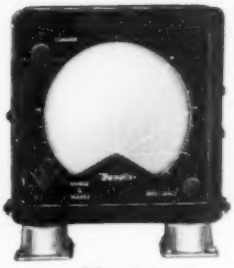


PPI - 1 A

CON - 1 A

FLUSH MOUNTED ADF LOOP ANTENNA

Completely eliminates drag. It's designed to work with all Bendix ADF equipment. Equal or greater sensitivity than present day loops. Better anti-static performance.

LPA-70

NEW ADF RECEIVER

ADF-70

Operates from AC or DC power supply. Fits in standard ½ ATR rack. Provides system bearing accuracy of plus or minus 3 degrees throughout frequency range of 90 to 1750 kc.

New electrically operated remote tuning system permits instant selection of any station.

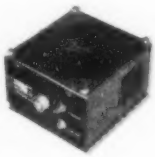
AUDIO

Complete audio equipment for paging, announcing, interphone and passenger entertainment systems for airlines and executive aircraft.

A high fidelity audio amplifier provides 20 watts output with very low distortion. Available for use with dynamic or carbon microphones.

A single package cockpit loudspeaker and amplifier eliminates need for constant pilot and crew use of headphones. Provides 4-watts of audio output with less than 10% distortion.

MI-36



MI-51

Bendix MOST TRUSTED NAME IN Radio

USAF Contracts

Following is a list of recent USAF contracts announced by Air Materiel Command.

Morse Instrument Co., 21 Clinton St., Hudson, Ohio, ES-1 kit, 46 ea., $48,425.

North American Aviation, Inc., Los Angeles International Airport, Los Angeles 45, spare parts, $500,000.

Pastushin Aviation Corp., 5651 West Century Blvd., Los Angeles 45, tank assy., 1,644 ea., $255,987.

Red Bank Div., Bendix Aviation Corp., Eatontown, N. J., dynamotor assy., 270 ea., $45,349.

Ryan Industries, Inc., 19159 John R. St., Detroit 3, intervalometer, counter-measure chaff dispenser, 1,247 ea., $472,750.

Stewart-Warner Electric Div., Stewart-Warner Corp., 1300 N. Kostner Ave., Chicago 51, components of radio set, 97 ea., $140,627.

Union Electric & Manufacturing Co., 1057 Summit Ave., Jersey City, oscillator, $68,313.

Westinghouse Air Brake Co., 401 Liberty Ave., Pittsburgh 22, trainer, flight simulator for F-100A aircraft, 6 ea., $2,648,201.

Allison Div., General Motors Corp., Indianapolis 6, spare parts and maint. tools for turboprop engines and propellers, $613,000.

Cardox Corp., 307 N. Michigan Ave., Chicago, crash fire truck and data, $256,023.

Douglas Aircraft Co., Inc., Los Angeles, fac. for prod. of B-66 and RB-66 acft. components, $3,550,000.

General Electric Co., 1 River Rd., Schenectady 5, generators, voltage regulators, control panels, spare parts and data, $1,035,940.

Link Aviation, Inc., Binghamton, N. Y., flight simulator, spare parts, handbook data, 4 ea., $2,848,079.

North American Aviation, Inc., Downey, Calif., facilities for prod. of rocket engines, $1,374,000.

North American Aviation, Inc., Fresno, Calif., fac. for the performance of Project "Pull-Out," $85,000.

North American Aviation, Inc., International Airport, Los Angeles 45, fac. for prod. of F-100 series acft., $1,272,515; spare parts for F-86 acft., $6,895,320.

Red Bank Div., Bendix Aviation Corp., Eatontown, N. J., motor generators, 1,500 ea., $747,780.

Willys Motors, Inc., 12801 E. Jefferson Ave., Detroit 14, modify IXR1300-4 and spare parts, $120,858.

Wolverine Diesel Power Co., 12700 Mansfield Ave., Detroit 27, generator set, spare

Speeds Swaging

Developed by modifying a commercial riveting device, this portable swaging tool fastens steel ball terminals to the end of aircraft cables in about five seconds, says Northrop Aircraft, Inc., Hawthorne, Calif. It weighs less than 25 lb. Repeated blows merge the ball and cable into a single solid piece capable of taking hundreds of pounds of tension. Northrop has granted a production and sales license for the device to Aircraft Tools, Inc., Los Angeles.

Piasecki

HAS IMMEDIATE OPENINGS FOR

★ EQUIPMENT DESIGN STAFF ENGINEER
To Be Responsible For All Helicopter Equipment Engineering

★ POWER PLANT GROUP ENGINEER
Must Have Turbine Experience

•

DESIGNERS – STRESS ENGINEERS
Rotor or Transmission Experience Desired

•

AERODYNAMICISTS
Helicopter Experience Required

•

VIBRATIONS ENGINEERS

•

STRESS ENGINEERS
Aircraft Experience Required

•

STRUCTURAL TEST ENGINEERS

All Of The Above Positions Require Minimum Of Three Years Aircraft or Related Experience and Degree in Engineering

Send Complete Resume To
FRANK COE, EMPLOYMENT MANAGER

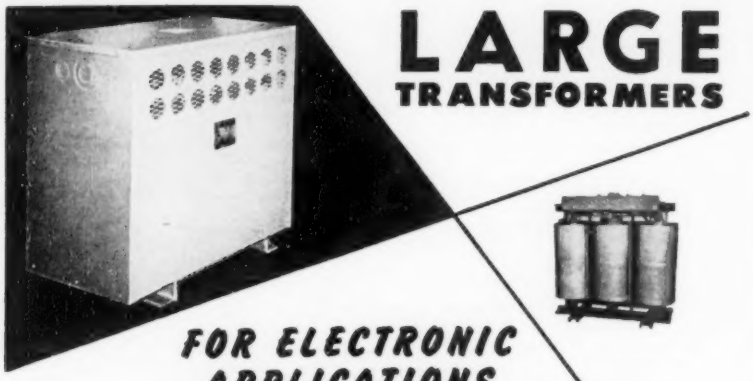
PIASECKI HELICOPTER CORPORATION
Morton, Pennsylvania
(Philadelphia Suburb)

AIRCRAFT TUBING

GOVERNMENT SPECIFICATION TUBING IN STOCK..

- A.I.S.I. 4130..... MIL-T-6736
- A.I.S.I. 4130..... AN-T-69
- A.I.S.I. X-4130.... AN-WW-T-850A
- A.I.S.I. 1025..... AN-WW-T-846

SERVICE STEEL · DETROIT, MICHIGAN



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FOR ELECTRONIC APPLICATIONS

For electronic applications requiring special or experimental transformers of large capacity Acme Electric can supply custom-built units designed to exact electrical characteristics and performance requirements.

We invite your inquiry.

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TRANSFORMERS

flight control by SUMMERS

Designers and volume producers of gyro components for aircraft, target drones and guided missiles. Precision instruments for general industrial application.

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altitude controls
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SUMMERS GYROSCOPE COMPANY
2328 Broadway, Santa Monica California

AIRCRAFT SENSENICH PROPELLERS

...for complete dependability and superior performance

Designers and pilots alike know that, for outstanding service, it's *best* if it's a *Sensenich*. For proof of this popularity remember—more personal planes are equipped with Sensenich propellers than any other make!

Fixed Pitch
METAL
CAA approved up to 135 hp.

Skyblade
CONTROLLABLE
CAA approved up to 165 hp.

Fixed Pitch
WOOD
CAA approved up to 225 hp.

TEST CLUBS
up to 3000 hp.

Write for bulletin and price list

Dept. W, Sensenich Corp., Lancaster, Pa.

Sensenich PROP SHOP ... prompt propeller repair of all makes fixed pitch Wood. Sensenich, Hartzell, Beech Controllable, Metal or Wood; Sensenich and McCauley fixed pitch Metal. Magnaflux, etching, anodizing and plating service.

parts, engr. and maint. data, 538 ea., $2,526,264.

Beech Aircraft Corp., Wichita 1, kits for acft. accessories, 58 ea., $49,659.

Bendix Products Div., Bendix Aviation Corp., South Bend 20, Ind., brake assy., 170 ea., wheel assy., 66 ea., $58,671; brake assy., 183 ea., 124 ea., $51,579; brake assy., 820 ea., $320,357.

Camfield Mfg. Co., 718 North Seventh St., Grand Haven, Mich., antenna, $99,247.

Cook Electric Co., 2700 No. Southport Ave., Chicago 14, control assys., engr. and maint. data, 2,057 ea., $83,205.

Curtiss-Wright Corp., Wright Aeronautical Div., Wood-Ridge, N. J., fac. for testing ramjet engines, $739,000.

Douglas Aircraft Co. Inc., Santa Monica, Calif., modification of C-124A-1 and MTU, $136,781.

Federal Aircraft Works, 3456 North Mississippi Drive, Minneapolis 12, ski assy., 76 ea., $67,565.

General Electric Co., 1 Jimson Rd. Cincinnati 15, turbojet engines, 206 ea., airframe mounted, 388 ea., $22,142,210.

General Tire & Rubber Co., 1708 Englewood Ave., Akron, wheel assy., tail, 136 ea., wheel assy., nose, 2,214 ea., $90,533.

Goodyear Tire & Rubber Co. Inc., 1144 East Market St., Akron 16, wheel assy., main landing, 578 ea., $100,316.

Ketay Mfg. Corp., 555 Broadway, New York, indicator, fuel flow, spare parts, special tools and GHE, 34 ea., $42,375.

Minneapolis-Honeywell Regulator Co., 2600 Ridgway Rd., Minneapolis, components of autopilot, S/P, special tools, $5,599,906.

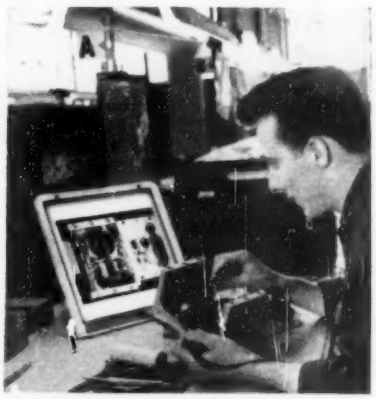
Pastushin Aviation Corp., 5651 W. Century Blvd., Los Angeles 45, jettisonable fuel tank for F-89D acft., 300 gal. and spare parts, 1,976 ea., $758,657.

Studebaker Corp., South Bend, preparation of tooling for shipment, $645,000.

AC Spark Plug Div., General Motors Corp., Flint 1, Mich., bomb release computer, 7 ea., bomb release computer, 6 ea., remote compass trans, 38 ea., $93,573.

Allison Div., General Motors Corp., Dayton 1, Ohio, propeller Assys., 384 ea., propeller assys., 95 ea., $9,074,967.

Bell Aircraft Corp., P. O. Box 482, Ft



Assembly From Pictures

Working directly from color transparency which is a replica of the finished product, Bell Aircraft Corp. assembler is shown completing work on electronic component. This method is said by Bell to minimize human error, reduce the number of blueprints and schematics required and save substantial time and cost. Previous methods required the building of a prototype model to which workers could refer. This required constant movement back and forth from work table to prototype and, in addition to loss of time in that manner, tied up costly models which otherwise could have been consigned for shipment.

Worth, Tex., spare parts for depot maintenance, $361,318.

Bendix Products Div., Bendix Aviation Corp., South Bend 20, Ind., wheel assy., 460 ea., wheel assy., 405 ea., brake assy., 460 ea., $1,326,321.

Douglas Aircraft Co., Inc., Long Beach, Calif., facilities for manufacturing of aircraft, $2,919,000.

Eclipse-Pioneer Div., Bendix Aviation Corp., Teterboro, N. J., speed indicator, 135 ea., $53,695; indicator, hydraulic press—engineering data technical publication, $28,564; transmitters, 670 ea., 360 ea., 144 ea., $148,767.

Kollsman Instrument Corp., 80-08 45th Ave., Elmhurst, N. Y., speed indicator, 136 ea., $54,074.

Link Aviation, Inc., Binghamton, N. Y., simulator, engineering data, 3 each, $2,102,556.

Motorola, Inc., 2710 North Clybourn Ave., Chicago 14, comp. of radar set, $217,480.

Munston Mfg. and Service, Inc., Beech St., Islip, N. Y., control panel, 1,270 ea., $79,057.

North American Aviation, Inc., Downey, Calif., facilities for the production of rocket engines, $500,000.

Philharmonic Radio and TV Corp., 235 Jersey Ave., New Brunswick, N. J., receiver, trans., cable assy. and data, $621,189.

General Electric Co., X-Ray Department, 4855 Electric Ave., Milwaukee, Wis., K-37 camera, 24 ea., $82,760; camera system, $44,000.

Westinghouse Electric Corp., 32 North Main St., Dayton 2, O., generator, 37 ea., regulators, voltage, 118 ea., $53,006.

Navy Contracts

Contracts recently announced by the Navy's Aviation Supply Office, 700 Robbins Ave., Philadelphia 11, are:

Chelsea Clock Co., 284 Everett Ave., Chelsea, Mass., clock, wall, $51,862.

Clifford Mfg. Co., Groove St., Waltham 54, Mass., oil cooler for T-28B, 194 ea., $48,684.

Dalmo Victor Co., 1414 El Camino Real, San Carlos, Calif., motor, 84 ea., $33,500.

Eclipse-Pioneer Div., Bendix Aviation Corp., Teterboro, N. J., reproducible copy and offset negatives of technical publications, $41,305.

General Electric Co., 1405 Locust St., Philadelphia 2, maintenance parts for use on generators, $43,428; bearing, 3,000 ea., $26,910.

Gladden Products Corp., 635 W. Colorado Blvd., Glendale 4, Calif., hydraulic valve, 409 ea., $34,339; hydraulic valves, $84,542.

Ludwig Honold Mfg. Co., Chester Pike and Folcroft Ave., Folcroft, Pa., reusable containers, 15 sets, $80,497.

Pacific Div., Bendix Aviation Corp., 11600 Sherman Way, North Hollywood, Calif., hydraulic valve, 208 ea., $27,830.

Patten Co., Inc., 142 Green St., Worcester 8, Mass., life raft, drop, multi-place, 581 ea., $217,875.

Pickering and Co., Inc., 309 Woods Ave., Oceanside, N. Y., accelerometers, $52,182.

Thompson Products, Inc., 23555 Euclid Ave., Cleveland 17, maintenance parts for various aircraft, $32,916.

Western Gear Works, P. O. Box 192, Lynwood, Calif., actuator, and maintenance parts for various aircraft, $50,305; actuators, $64,336.

Westinghouse Electric Corp., 3001 Walnut St., Philadelphia, parts for J40-WE-22AG engines, $126,820.

AiResearch Mfg. Co., 9851-9951 Sepulveda Blvd., Los Angeles 45, hot wheel assy., 149 ea., $192,657; retrofit kits, $106,400.

Bendix Products Div., Bendix Aviation Corp., South Bend 20, Ind., brace assy., main gear actuating rod, 78 ea., $105,758; maintenance parts to overhaul Bendix TJC1, control, $52,352.

Goodyear Tire & Rubber Co., 1144 E. Market Street, Akron 16, wheel assy, 979 ea., $77,272.

Hydro-Aire, Inc., 3000 Winona Ave., Burbank, Calif., Fuel valve assy., $39,836.

New Service Hangar recently added at Rentschler Airport.

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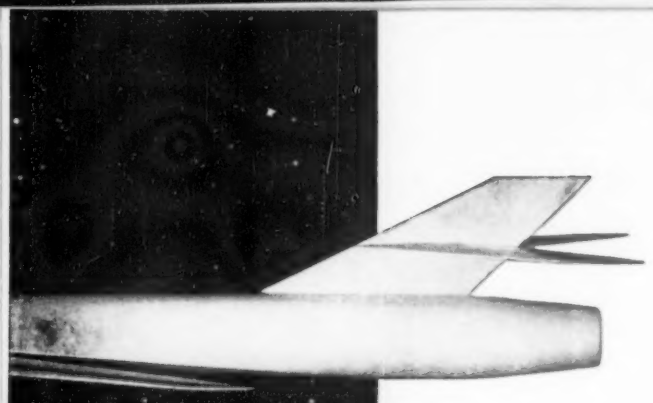
TOMORROW'S AIRCRAFT One step closer
Putting the finger
on unseen aircraft



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Typical of such "intelligence" is an Air Arm Defensive (radar controlled turret) system. During "lock-on", its gun dispersion pattern is superior to patterns obtained with the turret anchored and radar inoperative. Automatic lock-on and search-while-track capabilities for radar; radar-autopilot tie-in and automatic low visibility approach, are other Air Arm solutions to automatic flight. Already in final flight test stages, they typify the "intelligence" bridging the gap between man and his machine.

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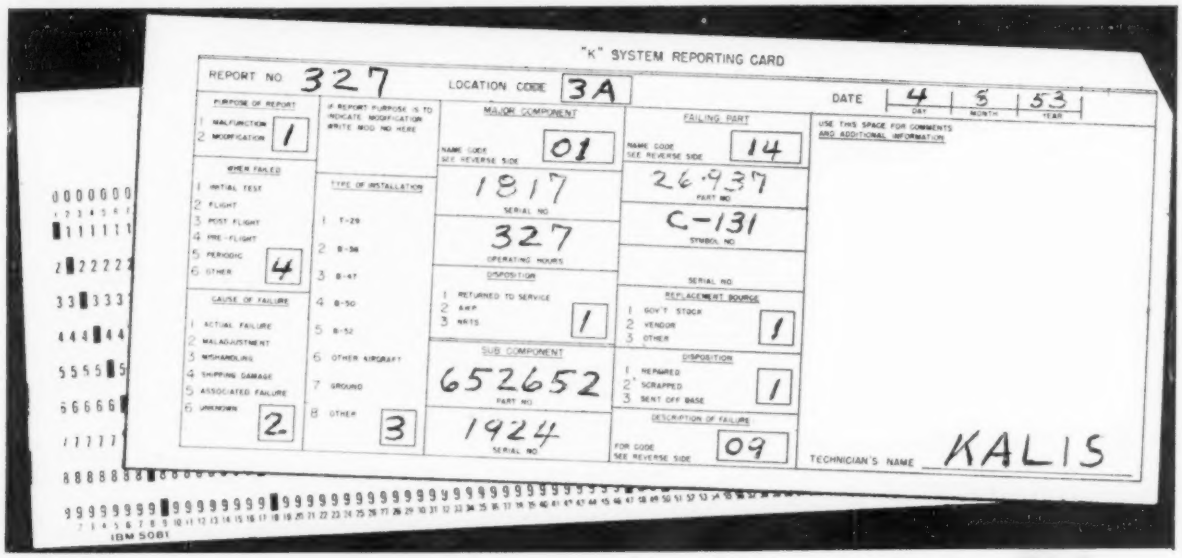

OLD REPORT, showing a Sperry K-system report with appropriate filled-in squares keying answers, overlaps companion punch card.

Faster Failure Reports to Aid Industry

By Philip Klass

Dayton—USAF's avionic, engine, and equipment suppliers are going to get more information on field failures of their products, and get it faster, from a new punch-card reporting system which goes into operation in November. The new system also will be used for airframe troubles on selected newer types.

Although all segments of the aviation industry are expected to benefit, the avionics industry may profit the most. The relatively small number of airframe and engine manufacturers are usually able to keep tab on their products through tech reps. This is much more difficult for the very numerous avionics industry, with its wide variety of products.

The failure report forms which will be used for avionic equipment have been standardized within the Defense Department for use by all three services. At present, the engine and airframe forms will be used by USAF.

▶**Advantages**—The new punch-card failure report system is expected to:

- **Pinpoint devices and components with high failure rates.**
- **Spotlight critical circuits which need redesign.**
- **Permit more realistic spare parts procurement.**
- **Enable avionic designers to predict reliability of new equipment while it is still in the development stage.**

▶**Guinea Pigs**—These anticipated ben-

ELECTRONIC FAILURE REPORT DD — CONTROL NO.

1. REPORT NO.	2. REPORTING ACTIVITY	3. REPAIRED OR REPORTED BY (NAME)	4. DATE OF FAILURE
5. EQUIPMENT INSTALLED IN (TYPE AND NO.)	6. TIME METER READING OR INSTALLATION LOG TIME	7. WAS MISSION ABORTED? ☐ YES ☐ NO	8. OPERATIONAL CONDITION
EQUIPMENT	9. MODEL DESIGNATION AND MOD. NO.	10. SERIAL NO.	11. CONTRACTOR	12. CONTRACT OR ORDER NO.
COMPONENT (MAJOR UNIT)	13. MODEL DESIGNATION AND MOD. NO.	14. SERIAL NO.	15. CONTRACTOR	16. CONTRACT OR ORDER NO.
ASSEMBLY OR SUBASSEMBLY	17. ASSEMBLY AND MOD. NO.	18. SERIAL NO.	19. MANUFACTURER	20.
PART DATA	21. PART NAME OR TUBE TYPE	22. STOCK NO. OF FAILED ITEM	23. PART REF. DESIG. (V-101, R-101, ETC.)	24. REPAIR TIME (MANHOURS)
	25. HOURS IN SERVICE	26. MANUFACTURER OF FAILED PART	27. SERIAL NO.	28. WAS REPLACEMENT PART AVAILABLE LOCALLY ☐ YES ☐ NO

29. FIRST INDICATION OF TROUBLE
1 ☐ INOPERATIVE
2 ☐ INTERMITTENT
3 ☐ LOW PERFORMANCE
4 ☐ NOISY
5 ☐ OFF FREQUENCY
6 ☐ OUT OF ADJUSTMENT
7 ☐ OVERHEATING
8 ☐ UNSTABLE
9 ☐ OTHER

30. TYPE OF PART FAILURE FROM FLY LEAF ☐ CODE NO.

31. CAUSE OF FAILURE
1 ☐ NORMAL OPERATION
2 ☐ FAULTY PACKAGING
3 ☐ MISHANDLING
4 ☐ OTHER
5 ☐ STORAGE
6 ☐ INSPECTION OR TEST
7 ☐ ASSOCIATED FAILURE-EXPLAIN

32. WAS THE PART REPLACED DURING PREVENTIVE MAINTENANCE? ☐ YES ☐ NO

USE REVERSE SIDE FOR EXPLANATIONS

NEW REPORT covering avionics failures, supersedes form above, permits more detailed on-the-spot entries.

ALL-METAL...RIGHT PRICE

All-Metal Cessna 170 Offers Lowest Upkeep Cost—World's Safest, Smoothest Landing Gear For Only $8295 (U. S. PRICE)

Now, every business pilot can afford to own a big, roomy *all-metal* airplane! For in the Cessna 170, you get the strength and safety of all-metal construction for only $8295—it's the only all-metal airplane in the low-price field! Offers you greater economy. Utility, too! Leave your ship out-of-doors in rain or snow, enjoy lower maintenance and the lasting beauty of all-metal at lowest cost. Cessna 170 is also the *only* low-priced airplane that offers you the world's safest, smoothest landing gear. It absorbs shock, smooths rough fields, simplifies cross-wind landings, requires no maintenance. See and fly the 1954 Cessna 170—*undisputed best buy in the low-price field* — at your nearest Cessna dealer's today. He's listed in a column on the facing page. Or, for more information, write CESSNA AIRCRAFT CO., DEPT. AE-S, WICHITA, KANSAS.

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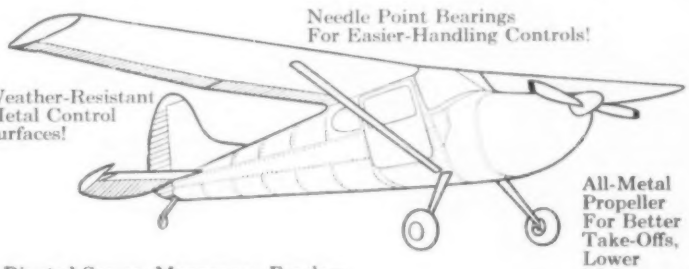
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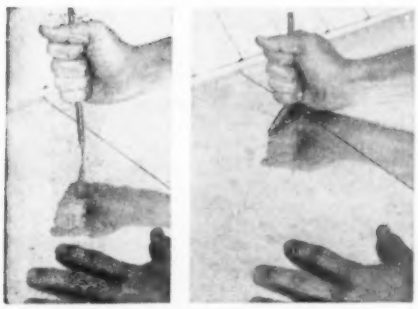
All-Metal Propeller For Better Take-Offs, Lower Maintenance
Riveted Seams, Monocoque Fuselage For Greater Over-all Strength!

Cessna 170 AIRCRAFT COMPANY



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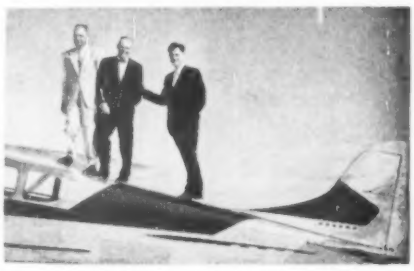
Three men stand on a Cessna 170 fuselage to show the strength of all-metal construction. It means a sturdier, safer cabin, lower maintenance cost, longer airplane life.



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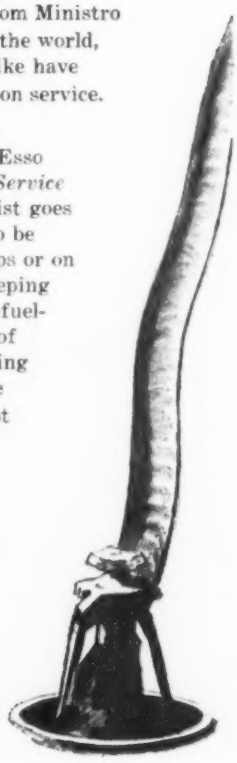

of all the world's international airlines . . . 8 out of 10 use

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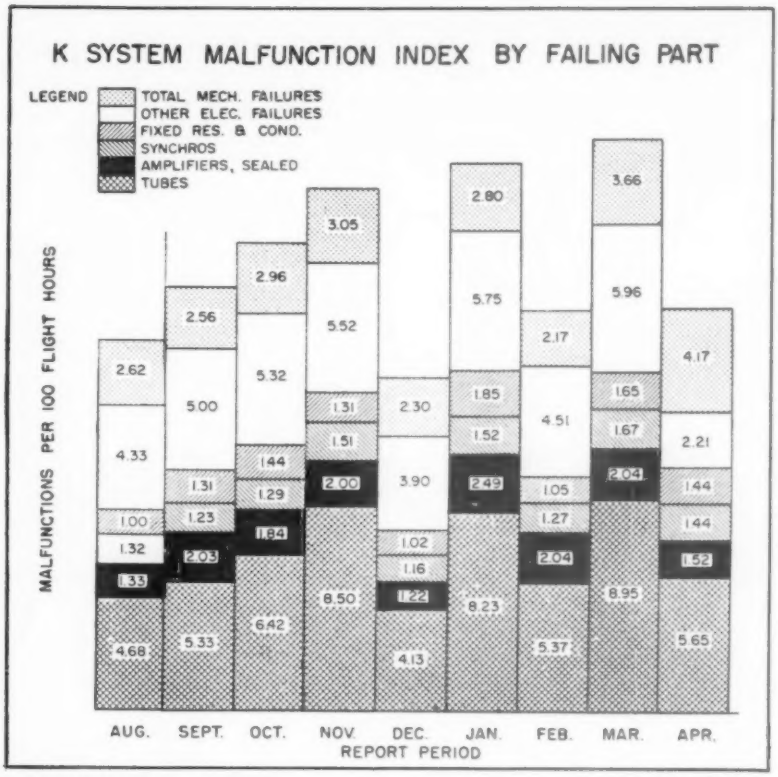
AVIATION PRODUCTS


K SYSTEM MALFUNCTION INDEX BY FAILING PART
LEGEND
TOTAL MECH. FAILURES
OTHER ELEC. FAILURES
FIXED RES. & COND.
SYNCHROS
AMPLIFIERS, SEALED
TUBES
MALFUNCTIONS PER 100 FLIGHT HOURS
AUG. 2.62 4.33 1.00 1.32 1.33 4.68
SEPT. 2.56 5.00 1.31 1.23 2.03 5.33
OCT. 2.96 5.32 1.44 1.29 1.84 6.42
NOV. 3.05 5.52 1.31 1.51 2.00 8.50
DEC. 2.30 3.90 1.02 1.16 1.22 4.13
JAN. 2.80 5.75 1.85 1.52 2.49 8.23
FEB. 2.17 4.51 1.05 1.27 2.04 5.37
MAR. 3.66 5.96 1.65 1.67 2.04 8.95
APR. 4.17 2.21 1.44 1.44 1.52 5.65
REPORT PERIOD

BREAKDOWN of K-system failures covers each type of fault by type, month and flight time.

cfits are no mere speculation. They are based on more than a year's experience with two similar systems. One, set up by Air Materiel Command for the Air Defense Command, covered a wide variety of ground-based and airborne equipments. The other, operated by Sperry Gyroscope Co. under AMC sponsorship, reported K-bombing system failures.

This latter program enabled AMC to cut procurement of bombing system spare parts from $63 million, budgeted using the best previously available techniques, to only $17 million, based on actual consumption figures obtained from failure report cards. This program also has provided information which enabled Sperry to improve equipment reliability, and was useful in the design of a new bombing system.

The new USAF/Defense Dept. system, and the ADC and Sperry programs which it replaces, resemble the punch-card failure reporting technique which General Electric disclosed several months ago (AVIATION WEEK June 7, p. 65).

► **On-the-Spot-Reporting**—It enables USAF maintenance personnel to conveniently make an on-the-spot report of every avionic equipment failure on a form which can be quickly converted to punch cards at AMC headquarters or depots.

For example, the card (which comes in a check-book type folder) has blanks for filling in such things as:

- **Location** and date of failure.
- **Equipment,** component, and subassembly involved, including part numbers and manufacturer.
- **First indication** of trouble (by checking one of several squares).
- **Type of failure** (using one of 66 different codes listed on the fly leaf of the folder in which the cards come).
- **Cause of failure** (by checking one of several squares).
- **Elapsed-time** meter reading, if equipment has such a device, to indicate how many hours it has been operated.

ELAPSED TIME INDICATOR (top) measures time avionics equipments are in use.

► **Tells a Tale**—Once the failure report information is in punch card form, it can be machine-sorted and collated rapidly to provide a variety of useful data. For instance:

- **Number of equipment failures,** according to type of equipment, its manufacturer (where there are two or more sources), type of failure, type of aircraft in which used, base location, or length of time in service. (Some newer avionic equipments have elapsed-time indicators to show how many hours equipment has been operated.)
- **Number of component failures,** according to type of component, manufacturer, particular circuit in which used, or its operating environment.

► **Finger Will Point**—Weekly accumulations of cards for a wide variety of equipment can be machine-sorted to see how many tubes, for instance, of each type failed.

Where failure rates are high for a particular type, the cards can be resorted to see if failures are high for any particular equipment, circuit, type airplane, or specific air base, indicating inadequate equipment cooling, faulty circuit design, excessive airplane ambient temperature, or poor base maintenance.

If failures are uniformly distributed, the tube type itself is suspect, and can then be analyzed for comparative quality between two sources, or for an inferior lot produced by any one manufacturer.

Duplicate decks of punch cards probably will be available to prime contractors, covering failures of their own equipment, to enable them to run more detailed analyses, AMC indicates. These details are not yet firmed up.

► **URs to Remain**—The new punch card field failure report will complement rather than replace the long-used Unsatisfactory Report (UR). The cards will be used to report routine failures; the URs will be employed solely for urgent or unusual type failures.

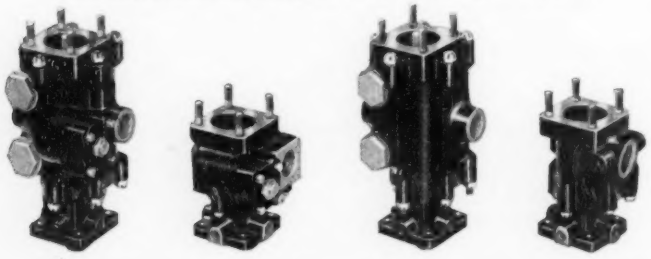
For example, if an occasional 6J6 tube fails in a bombing radar, it will be reported on the punch-card form. If, however, a specific 6J6 explodes every time the bombing radar is turned on, this condition will be reported on a UR. The former is a "fill-in-the-blanks" type of report; the latter is a narrative type report.

Another new form, called the Tear-Down Deficiency Report, is being added for use at AMC overhaul depots and AMAs. Where the quantity or nature of punch-card reports or URs suggests a basic design shortcoming, the depot's product manager may call for a complete tear-down and analysis of an equipment. Following this analysis, a narrative-type Tear-Down De-

ENGINE DRIVEN GEAR PUMPS

Chandler-Evans has developed a series of small gear pumps specifically designed for use in small turbo-jet and turbo-prop engines. These pumps are light, compact, relatively simple and precision built throughout. Assuring accurate control and constant flow of fuel, they make it possible for small turbo propulsion units to achieve maximum power and dependability.

This series of CECO Engine Driven Gear Pumps is manufactured in capacities from 2½ to 10 gpm, single or dual stage types, with or without relief valves. At 3600 rpm they are capable of delivering pressures of 600 psi. For the larger turbo-jet engines, CECO manufactures main and emergency fuel pumps in higher capacities.



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WEST HARTFORD 1, CONN., U.S.A.

ficiency Report is prepared for AMC Maintenance Engineering headquarters.

▶**The K-System**—The earlier AMC/Sperry punch-card failure report system for the K-bombing system was set up because of reliability problems which plagued the very complex, 1,700-lb., radar bombing system when it was first introduced. However, it also proved an effective guinea pig for the new failure report system now going into operation.

These reliability problems were complicated by the fact that the bombing system was made up complex optical, computer, and radar sub-systems, each made by a different manufacturer, with several sources for each sub-system.

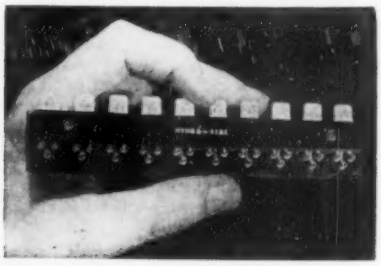
In addition to Sperry, manufacturers included Eastman Kodak Co., Farrand Optical Co., Western Electric Co., A. C. Spark Plug, International Business Machines Co., General Mills, National Cash Register Co., and Motorola.

▶**Fire Fighting**—For the first couple years, there was constant "fire fighting" on K-system troubles. Major sources of detailed information on field troubles came from individual sub-system suppliers' tech rep reports. In 1950, in order to better correlate these individual reports, AMC asked each supplier to furnish copies to Sperry which would then prepare an overall summary report on system difficulties.

However, these system summary reports became so big and unwieldy that their wealth of data could not be analyzed by AMC headquarters in time to be put to most effective use.

▶**To Speed Analysis**—In the Spring of 1952, AMC's Robert Breit recommended to Maj. Gen. Clarence Irvine that a punch-card reporting system be set up to speed the flow and analysis of K-bombing system data. The idea for such a technique, Breit says, was stimulated by a report by the Research and Development Board's Ad Hoc Committee on Reliability.

By fall, 1952, authorization was



Sockets for Transistors

Transistor sockets, designed to accept units with the RETMA 3E15 standard base, are now available in strip form from Hydro-Aire. Present model has 10 sockets, but company plans to make models to handle 30 and more transistors. Company address: 3000 Winona Ave., Burbank, Calif.

New AMERICAN Inertia Reel

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MODEL 20

1. **Lightest reel**—about 1.5 lbs.
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8. **Manual control is thinnest ever made,** only ½" thick over-all.
9. **Reel cannot be unlocked by quick retracting movement.**
10. **Can be mounted in almost any position,** as inertia locking action is controlled by a new inertia switch, mounted independently of reel. The light weight switch will operate several reels.
11. **Reel can be disassembled** and overhauled by user without returning to factory for recalibration. Only the trouble-free inertia switch is factory-sealed.
12. **Design incorporates suggestions** of aircraft manufacturers. Aircraft engineers available for consultation.
13. Uses same mounting hole spaces as other reels of our manufacture.
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We also make Unidirectional Reels conforming to Specifications MIL-R-8236 Type MA-1 and AN-R-29 amend 2.

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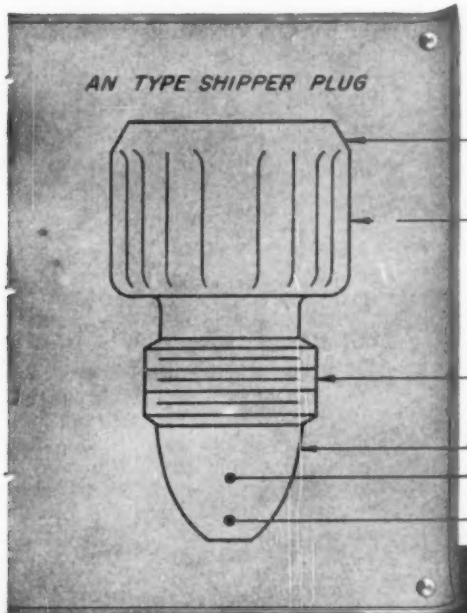

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granted and in February 1953 AMC met with all K-system contractors to discuss setting up such a program. By June, a sample card form had been prepared and put into use on a trial basis at selected Strategic Air Command bases. Based on this experience, the card was revised slightly and in August 1953 went into use at all bases using the K-bombing system.

► **Sperry-Operated**—AMC contracted with Sperry to operate the punch-card reporting system for all K-bombing system contractors. After Air Force issued directives advising its own and contractor personnel to cooperate, Sperry field engineers distributed the forms to USAF and airframe manufacturers' personnel, explained their operation, collected the filled-in cards, then returned them to company headquarters.

Sperry first screened the forms for serious errors or omissions, then converted them into punch cards. A duplicate deck was prepared for AMC, smaller decks for each of the major K-system suppliers, covering its own equipment.

A monthly accumulation of cards (5-7,000) was completely processed, tabulated and summarized in less than a week, Sperry says. Actual machine time was less, but the failure report system had to be dovetailed with other company demands for machine time.

Machine-prepared tabulations, which were distributed to interested USAF, airframe, and contractor personnel, included:

- **Part failures** grouped according to major sub-assembly involved, i.e. computer amplifier, azimuth amplifier, etc.
- **Parts consumption** for each airbase or other facility.
- **Summary of failing parts** and reason for failure.
- **Summary of major sub-assembly** failures versus time of failure (inflight, postflight, preflight, etc.) and versus type of aircraft in which used.

► **Interesting Findings**—In addition to providing realistic consumption figures for budgeting spare parts, the K-system program has turned up other interesting findings. For example, synchros and small servo motors, both widely used, appear to lack the required reliability, Sperry says. As a result, USAF has launched a program to improve synchro reliability, may launch a similar program for motors.

Tubes last longer in potted-sealed amplifiers than in unsealed ones. Sperry reports that if all sealed amplifier failures are assumed to be due to tube failures, sealed amplifier tubes show only half the failure rate of their counterparts in unsealed containers.

► **Source of Statistical Data**—The Air Defense Command and K-bombing system programs, and the new USAF-wide program which replaces them, provide a large statistical sample of data on component failures in a variety of equipments.

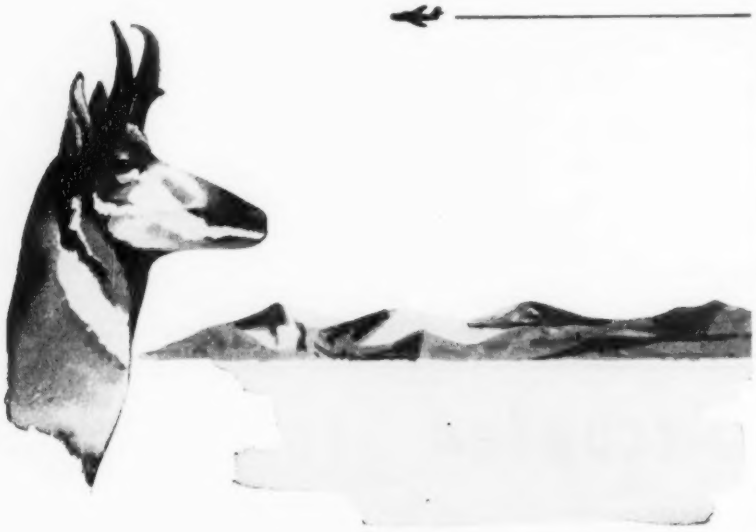
Since new systems now under development use essentially the same tubes, motors, synchros and other components, this data will enable designers to predict the frequency of malfunctions in new equipments.

This in turn will enable engineers to determine whether alternative (malfunction) modes of operation should be designed into the equipment to provide required reliability.

Component Makers Report Tiny New Units

No bigger than a paper clip, the size of a quarter, as small as a man's thumb . . . . avionic manufacturers are hard put to find new words to describe the miniature and subminiature components their designers are turning out to help cut the size and weight of airborne equipment.

Among the new devices, a tiny chopper (vibrator), Model A-175, can be operated at any frequency from 30 to 150 cps., in ambient temperatures of −65C to 100C, and will handle signal levels from 100 v. down to microvolts at 1 ma., manufacturer says.



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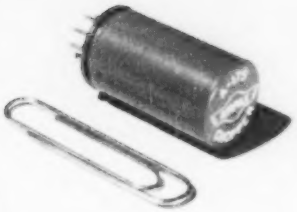
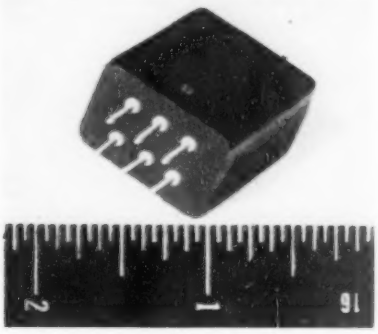


Unit comes in a hermetically sealed plug-in case, has a phase angle of 20 deg., dwell time of 167 deg. and reported life in excess of 1,000 hours. Manufacturer is Airpax Products Co., Middle River, Baltimore 20, Md.

Other tiny new components include:

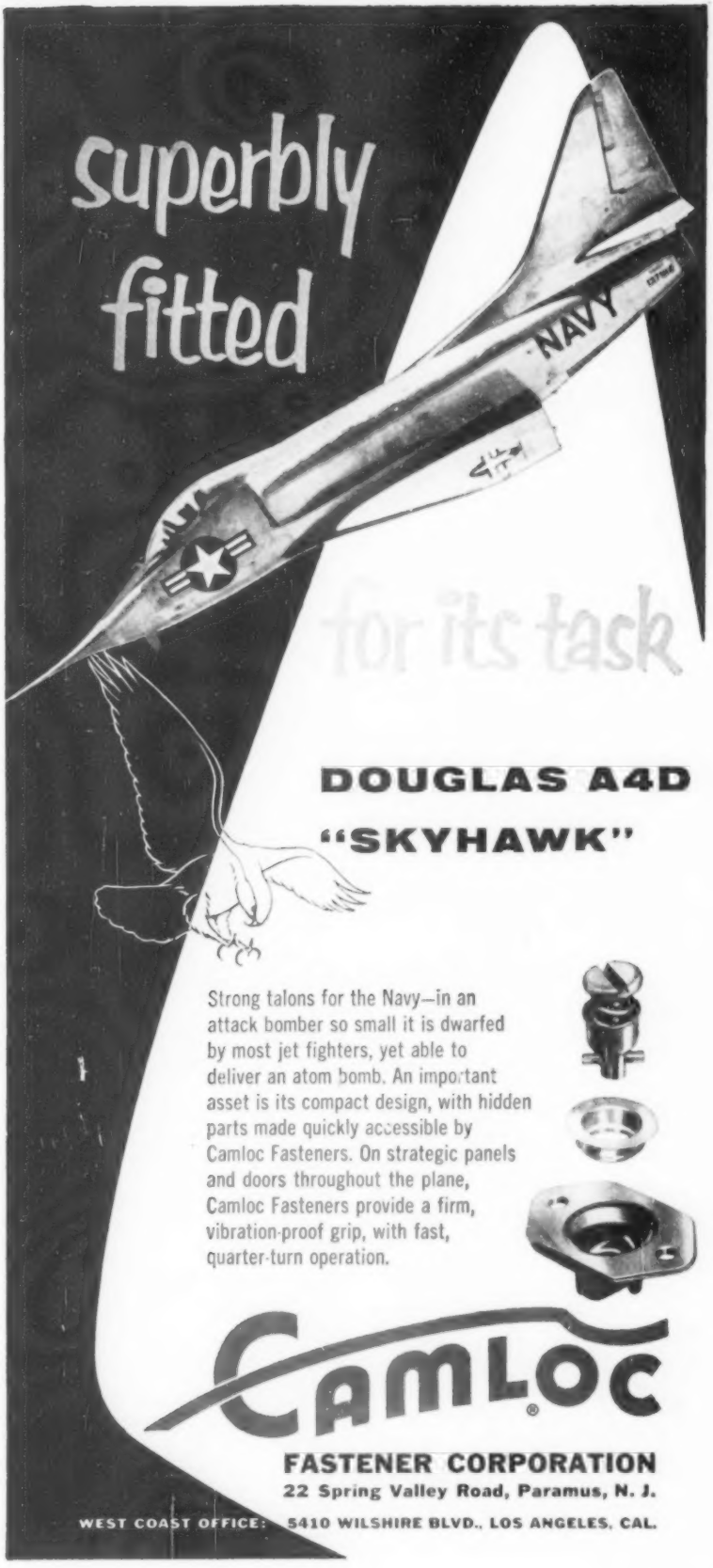
• **Wire-wound resistor,** hermetically sealed, is only ¼ in. long, comes in diameters as small as ¼ in. Resistor will operate in ambient temperatures of —55C to 125C, has temperature coefficient of 20 p.p.m./deg. C. Manufacturer is I-T-E Circuit Breaker Co., Resistor Div., 19th & Hamilton Streets, Philadelphia 30, Pa.

• **Sensitive polarized relay,** Type P-100, weighs only 1 oz., has sensitivity of less than 20 milliwatts. New relay, housed in a plastic case with plug-in terminals, has a coil resistance of 3,500 ohms,



reaction time quoted as 5 milliseconds, and may be operated at rates up to 90 cps. Unit comes in SPST style, with contacts rated at 0.25 amp. at 250 v. Made in England, new relay is available from American Telasco Ltd., Huntington, N. Y.

• **Ceramic capacitor,** using "flat pan" construction, is available with one to four sections, to simplify design of VHF bypass circuits. Unit can be mounted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flat against chassis. High self-resonant frequency results from effectively zero lead length between capacitor sections and ground. New flat pan ceramic capacitors are available in voltage ratings of 100-500 v. d.c. Bulletin 611 gives details. Sprague Electric Co., 327 Marshall St., North Adams, Mass.

New Microwave Units Reported

Miniature delay lines, in both lumped-constant and distributed-constant types, are among the recently announced components designed for microwave use. The devices:

• **Lumped-constant delay lines,** designed to MIL-T-27, are available in standard impedance range of 25 to 3,000 ohms, with time delay of 0.05 to 10 microseconds, rise time of 0.03 to 0.05 microseconds, maximum attenuation of 20% and maximum pulse voltage of 3,000 v. Manufacturer: Neutronics Inc., 2908 Nebraska Ave., Santa Monica, Calif.

• **Distributed-constant delay lines,** approximately half the size of previous design, cover impedance range of 500 to 2,000 ohms, with delay times of 0.1 to 1.0 microseconds, rise time and attenuation less than 10% in most cases. Units are designed to meet MIL-T-25. Manufacturer: PCA Electronics Inc., 2180 Colorado Ave., Santa Monica, Calif.

• **Pulse transformer,** Type PT-4, hermetically sealed four-winding unit with 2:2:1:2 turns ratio, has 120-ohm characteristic impedance, 0.03-microsecond rise time, 20% droop at 1 microsecond, 40% droop at 2 microseconds, and is designed to MIL-T-27, according to manufacturer. Non-hermetic seal, octal-base plug-in version of same transformer is labeled PT-3. Berkshire Laboratories, 598 Beaver Pond Road, Lincoln, Mass.

• **Radar antenna drive motor,** Model K16YB2, 60 cycle, 115 v. a.c. single-phase capacitor type has locked rotor torque of 500 in. lb., running torque of 430 in. lb. at 1,475 rpm., and pull-out torque or 700 in. lb. Motor uses ball bearings, is totally enclosed, fan-cooled. Mission-Western Engineers, Inc., 132 W. Colorado St., Pasadena 1, Calif.

• **High-voltage switch,** rated for 20 kv. d.c., is a solenoid-operated SPDT device for switching purposes in d.c. pulse systems such as radar. Naer Corp., 2301 So. Purdue Ave., West Los Angeles 64, Calif.

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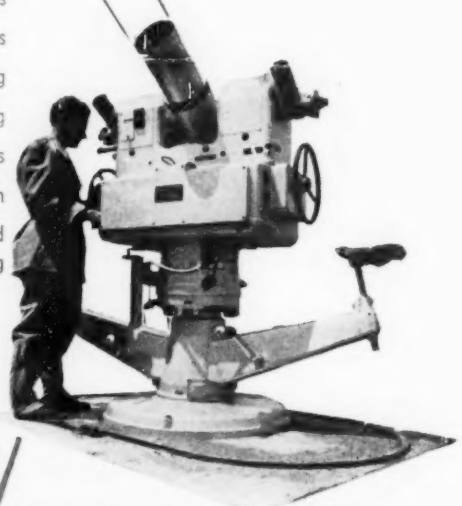

IN UNITED STATES
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FILTER CENTER

► **New Duplexer Fuel Gage**—Minneapolis-Honeywell will soon announce a new "duplexer" capacitance-type fuel gage system which enables two sensors and indicators to operate from a single amplifier.

► **Collins Eyes Airborne Radar**—Collins Radio is seriously considering entering the airborne storm-warning radar field and may officially announce its intentions soon.

► **Design Redundancy Urged**—Avionic designers were urged to use two relay contacts in parallel so that failure of one will not cause equipment failure. This practical application of "design redundancy" was made by Russell H. Lindsay, Boeing Airplane Co., speaking before the recent IAS meeting in Los Angeles.

Lindsay seconded an idea expressed previously by Dr. R. R. Carhart of the Rand Corp.: When the practical limits of equipment complexity and component reliability are reached, circuit redundancy offers the only means for further improvement in reliability.

► **USAF Maintenance Costs**—Air Force spends an average of twice the initial cost of avionics equipment in yearly maintenance on the equipment, a Rand Corp. study shows. —PK

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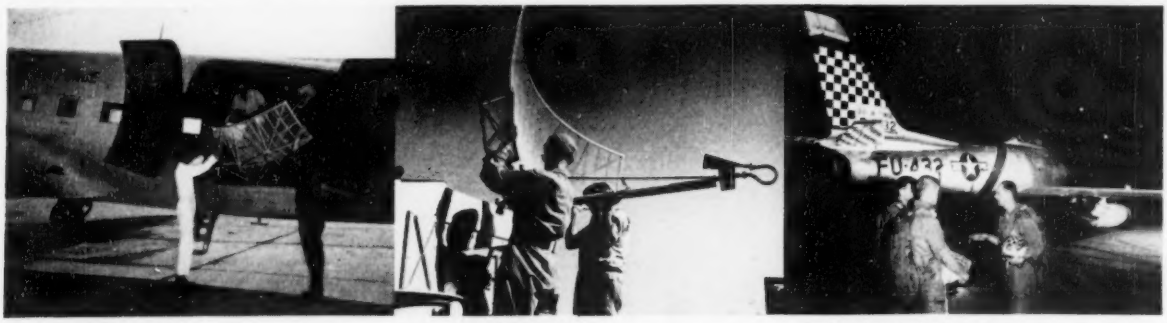

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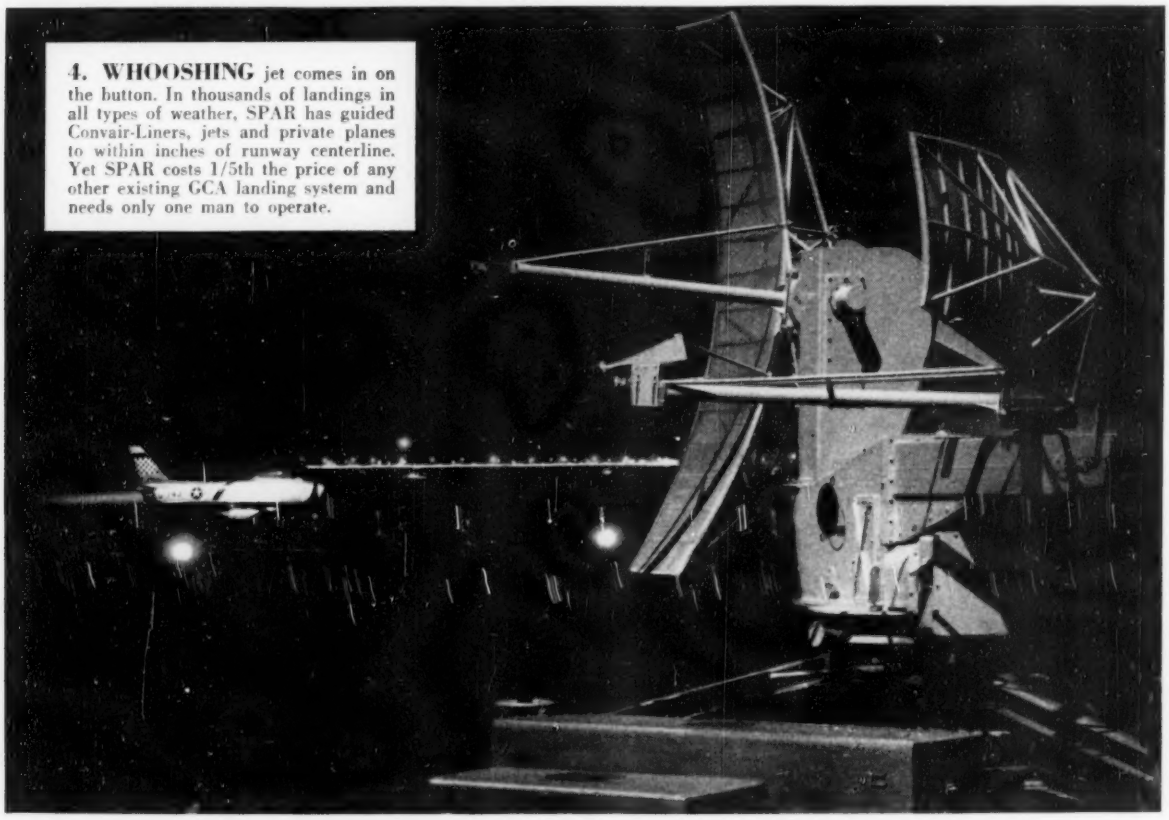

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Delta Reports on DC-7 After 4 Months

● Turbo Compounds pose major service problem with new planes, but mechanical delays are, on whole, few.

By George L. Christian

Atlanta—A visit to Delta-C&S Air Lines' maintenance and operations headquarters here shows the airline busily engaged in shaking down its fleet of four DC-7s and pursuing a modification program to get maximum efficiency from its fleet of 20 Convair 340s.

The four DC-7s—six more are on order—have turned in an excellent performance record in their first four months, the airline says.

Another Delta-C&S project is a full-scale program of X-raying hidden and hard-to-get-at aircraft and engine components with a lightweight inspection machine. This is saving the airline countless maintenance hours.

DC-7 INSIGNIA on tail of Delta-C&S transport marks latest addition to carrier's fleet.

HEADQUARTERS at Atlanta, Ga., takes care of the airline's maintenance and operations.

Douglas DC-7s

Delta-C&S likes its DC-7s, says R. G. Johnson, engineering administrative assistant.

To back up the statement, he pulled out these statistics giving the airline's current experience with the airplane:

For the first four months the planes were in service with Delta-C&S, the carrier experienced a total of only 49 mechanical delays for all reasons on its DC-7s. (A "mechanical delay" in Delta-C&S's book is: "Any delay attributable to mechanical causes—even if it is as short as a minute.") During the four-month period, the four planes flew a cumulative total of 3,674:21 hr.

Analysis of the delays shows the greatest single cause was the engines, which accounted for 21 delays during the period. Next came propellers and governors with 10 delays, accessory mechanicals with eight delays, and electrical mechanicals with six delays.

On the low end of the scale were maintenance cancelations, three; aircraft mechanicals, two; instrument mechanicals, two; miscellaneous delays, two.

During this four-month period, the planes' radio equipment had a perfectly clean slate, not being responsible for a single delay. This equipment is primarily from Collins and Bendix.

▶ **Engine Problems**—As a whole, Delta-C&S's DC-7s work well. Company spokesmen report: "We have had negligible trouble with the electrical system and none with the hydraulic systems. As far as the structure is concerned, we have experienced a few cracks in wing fillets, but Douglas is right on top of this with a fix."

Principal, but not overwhelming, headache has been the planes' Turbo-Compound engines. In the first four months, the airline experienced six total failures plus 13 unscheduled removals. Of the 19 total, six required complete overhaul, nine were "hospitalized" and returned to service and four were removed because the Lord mounts had gone beyond acceptable limits; the latter were returned to service after the mounts were changed.

The trouble with the Lord mounts, according to the airline, is that two of the six used to support the engine are close to the numbers two and three turbines, where the mounts are subjected to considerable heat. Delta-C&S says that Douglas is working on

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The wraps are taken off faster and more efficient aircraft every year. And still more amazing planes are on the drawing boards. As engine performance is stepped up, the requirements for power blades become more critical. New alloys for making power blades that can withstand increasingly higher temperatures must be developed. Austenal Laboratories has continued to come up with the answers for perfecting and casting these tough metals. The Microcast precision investment casting process is keeping pace with the demands of aircraft designers—thanks to 25 years' experience, expanded research and manufacturing facilities.

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This Seat Taken

Delta-C&S Air Lines has instituted a reservations system for its de luxe DC-7 flights.

Here is how it works. As passengers check in at the counter, they are shown a large cabin plan of the airplane. At each seat is a numbered, paper tag. The passenger merely tells the ticketing agent that he wants seat number so-and-so. The clerk removes the paper tag from a hook and clips it onto the ticket. Removing the tag from cabin plan shows that the seat is taken.

Airline officials report that the system has met with considerable passenger approval.

the problem and is devising a fix which will provide increased blast air cooling to the mounts in question. The airline is currently service-testing four sets of mounts using natural rubber rather than neoprene cores.

The airline is also experiencing cracks in turbine cooling caps, at the nozzle box external weld seams and in the units' solid vanes, but the situation is improving.

A precautionary measure which Delta-C&S maintenance crews take every 125 hours of engine operation is to pull and inspect the powerplant's rocker box scavenge oil pump. If any scoring is evident, the mechanics know that they have a broken upper or lower valve washer or a failed valve spring.

A further check of the engine's front and rear magnetic sump plugs indicates whether the rest of the cylinders have sustained any valve malfunction. Advantage of the double check is that if trouble is found, mechanics know in what group of cylinders to look for a failure. Oil strainers are checked every 30 hours and oil is changed every 125 hours—more often than with other engines.

Glen Cornell, Delta-C&S's DC-7 analyst feels that this 125-hr. precautionary check of all 18 cylinders has saved several engines which might otherwise have failed to a greater or lesser extent.

A trick used by Delta-C&S mechanics while overhauling Turbo-Compound engines is to put a cloth cover over the exhaust stacks to keep workers from inadvertently dropping something down what the airline calls "a perfect booby trap".

To eliminate troubles experienced by some DC-7 operators with the Goodyear three-disk, multiple-spot brakes, Delta-C&S has stopped using the brakes for parking. This keeps hydraulic pressure out of the brake cavity and

eliminates bell-mouthing of the brake cylinder. Also, brake cools more rapidly. Result is that the airline has experienced only 10 brake removals since it put the -7s into operation—eight for normal wear and one each for dragging and broken spots.

To keep the plane from rolling while parked Delta-C&S chocks the nose wheel. Since July, brakes have been doing "a very satisfactory job," says the airline.

▶ **Airborne Analyzers**—The airline is installing airborne Scintilla ignition analyzers in its DC-7s.

Work on the fleet of four planes is in progress and the six additional craft soon to be delivered will also receive the instrument. Flight engineers' indoctrination school is currently in operation.

Convair 340s

Delta-C&S's fleet of 20 Convair 340s is undergoing modifications, improvements, and test.

Johnson cites these more important changes:

• **Compass.** The airline has been experiencing trouble with the Eclipse Pioneer Fluxgate compass transmitters, one of which is mounted in each wing. According to the carrier's officials: "G loadings and vibration tore the units apart . . . even to cracking the transmitters' cases." So the airline moved the co-pilot's transmitter to the tailcone of the airplane, leaving the pilot's transmitter in the wing as a means of checking the difference in performance of the newly located instrument.

Here is what Delta-C&S engineers found: Average replacement time for the pilot's wing-mounted unit: 200 hr.; of the 19 aircraft which had the co-pilot's transmitter relocated in the tailcone, none has required replacement yet, although the oldest installation had piled up over 2,500 hr. at this writing.

Johnson says his company has received CAA approval for a 3,000-hr. overhaul period for the tailcone-mounted Fluxgate transmitters, and if it continues to ring up such excellent results, he anticipates an overhaul period extension beyond the 3,000-hr. mark.

• **Collision lights.** The airline has installed Grimes rotating anti-collision light on the top fin of one 340 and plans to go to a fleetwide installation on all 340s—its DC-6s and -7s are already equipped.

Because of the low bulb life of about 50 hr., the airline is testing GE ruggedized bulbs. Also, the airline has wired the anti-collision light circuit through the landing gear

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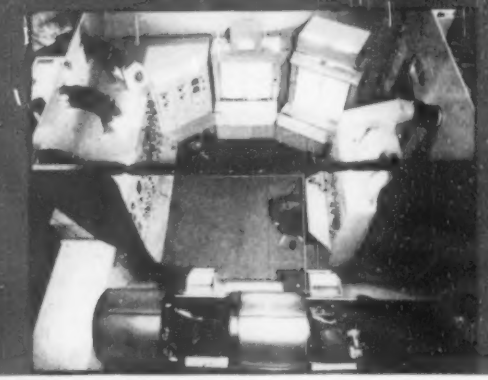

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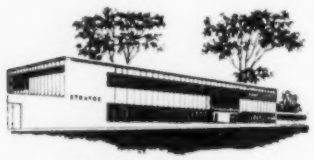

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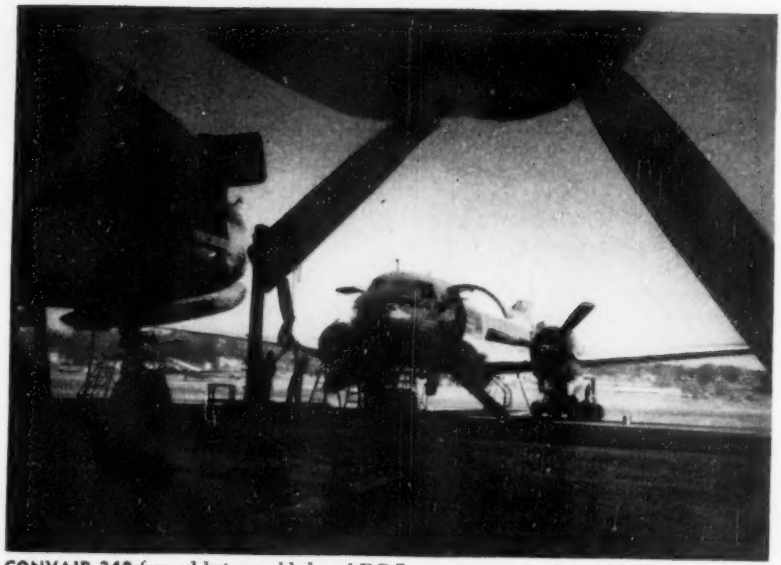


CONVAIR 340 framed between blades of DC-7 prop is one of a fleet of 20 being modified.

microswitch so the light is extinguished when the plane lands. Reason is because, being entirely enclosed, there is no way of rejecting the heat generated by the lamp when the plane is traveling at low speed or is stopped. In flight, airstream past the light provides sufficient cooling. Light is turned on and off through the navigation light switch. The ruggedized bulb stretched bulb's life from the 50-hr. mark to a more acceptable 700 hr.

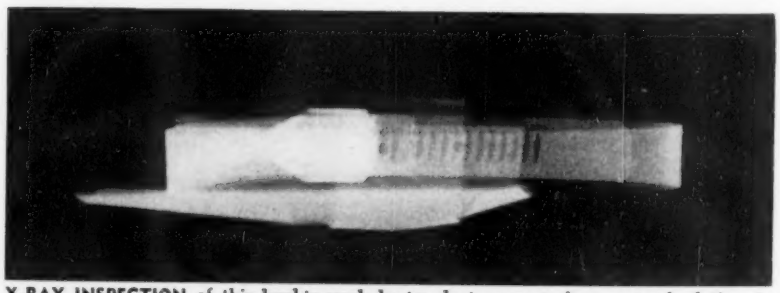
Another light which has low bulb life is the wing illuminating light. High replacement rate is attributed to the fact that it is mounted in the side of the nacelle where it is subjected to considerable engine vibration which keeps the average life down to an average of something like 100 hr. It is too early to tell how much the ruggedized bulb will prolong bulb life. Johnson said he would use the ruggedized bulb fleet wide if he could get enough of them from GE.

▶ **Here & There**—Delta-C&S cites these other programs in progress on its Convair fleet:

• **Scintilla analyzers.** The carrier is currently wiring all its 340s to receive the Scintilla portable-airborne ignition analyzers. Reason for choosing the Scintilla unit is to standardize with the units going into the DC-7s. Also, the airline already has two portable units, one in the engine test cell and the other in the hangar here at Atlanta which are also used on the company's seven DC-6s on a portable basis.

• **New flooring.** Delta-C&S found that factory-installed honeycomb flooring in its 340s did not stand up well and was easily punctured by women's high-heeled shoes. The buffet is another area where the floor is easily damaged if food containers are accidently dropped.

So the airline is replacing the honeycomb with built-up, corrugated flooring made in its own shops. A Pacific press brake is used to fabricate all channels, angles and other shapes required. Replacement is being made on an "as required" basis in all areas in the cabin except under the seats. The aluminum flooring is standing up well. Some has been in service for over a year and has given no trouble so far, Johnson reports. Weight increase is approximately 20 lb.



X-RAY INSPECTION of this hard-to-reach heater duct support clamp cuts check-time to one-half manhour where previously this job took D-C&S mechanics about 18 manhours.

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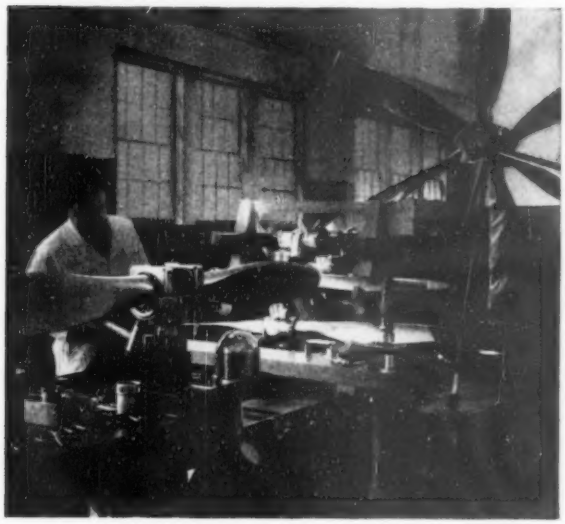

New prop shop is CAA Approved for servicing of Hamilton Standard and Hartzell propellers. In foreground is Supervisor Ed Heine who puts 16 years' prop experience into every job.

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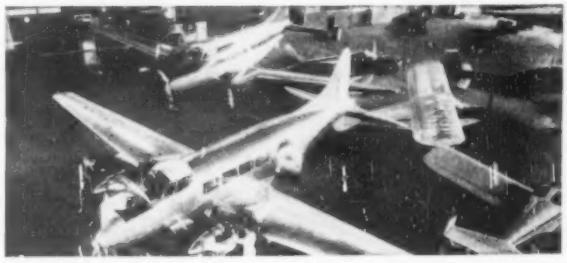
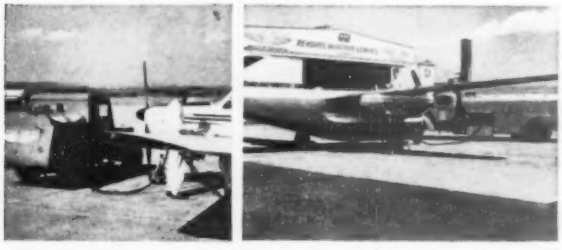


Most major inspections completed in a day. Here in the main hangar, a staff of 70 RAS specialists insure fastest, most dependable service. In foreground is twin-engine de Havilland for which RAS is sales agent.



2 Ways to gas-up with Cities Service Gasolene . . . Jeep-truck for small aircraft, large tank-truck for bigger planes. "Cities Service Gasolene gives best performance," says RAS.

Filling Up with Koolmotor Aero Oil . . . RAS uses only new Koolmotor because, says Pres. Bertolet: "We've found it reduces oil consumption, valve guide wear and gives better engine protection."

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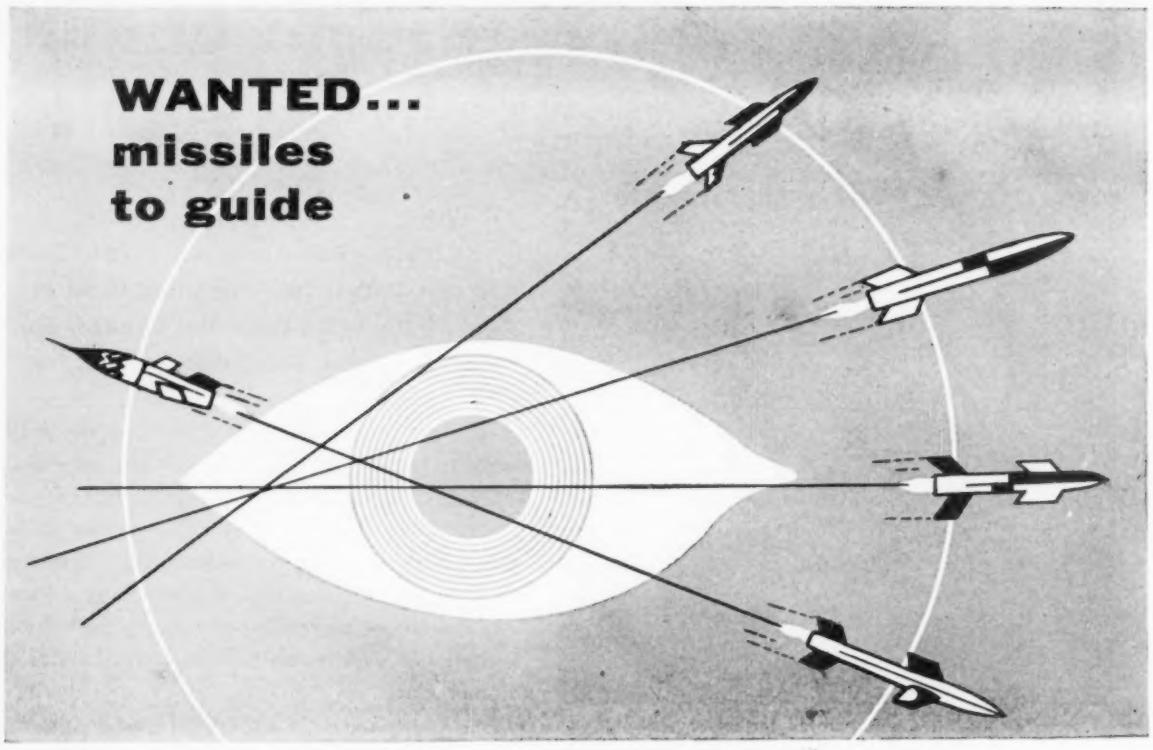

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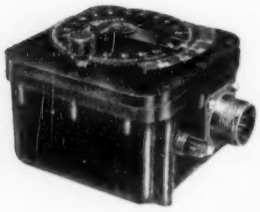

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So far, about one half of the Convair fleet has been converted.

X-ray Inspection

A new inspection technique recently inaugurated by Delta-C&S is the use of a portable X-ray machine to inspect hard-to-reach and concealed structures in its aircraft.

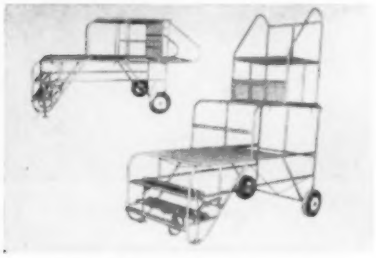
Although the airline has only had the equipment for five months, it is sure that it will pay for itself in short order. Johnson cites this example of time-saving. To inspect a clamp supporting a heater duct in the leading edge of a DC-6 requires about 18 man-hours, including the time to remove and re-install leading edge. With the portable X-ray machine, the job has been sliced to one-half a man-hour.

Albert Edwards gave AVIATION WEEK these statistics concerning the machine: Power rating is 175 kv., which gives a penetration of 6 in. with aluminum and 2 in. with steel.

Cost is just under $10,000. Machine is manufactured in Denmark by Carl Drenck. U. S. distributor is Holger Andreasen, Inc., San Francisco.

Edwards says, "The Drenck machine was the only X-ray machine we could find that had enough power to do a good job for us, yet is light enough to be truly portable . . . The whole unit weighs about 300 lb.—197 lb. for the tube assembly plus 95 lb. for the remote control unit plus a heavy cord used between the two units."

The X-ray machine is used to inspect stringers and doublers, structure inside fuel cells and access doors (this eliminates going into fuel cells to check for cracks and corrosion), and engine parts such as piston pins.



Folding Platform

New folding baggage-loading stand produced by Bil-Jax, Inc., is made of tubular steel framework and expanded metal platforms. It offers three working heights, making it usable for nose or underbelly loading and unloading. Lower deck is 35 in. high, middle deck 62 in. high and the top reaches 86 in. Unit is 44 in. wide. Upper platform folds and nests out of the way when not needed. Address: Archbold, Ohio.

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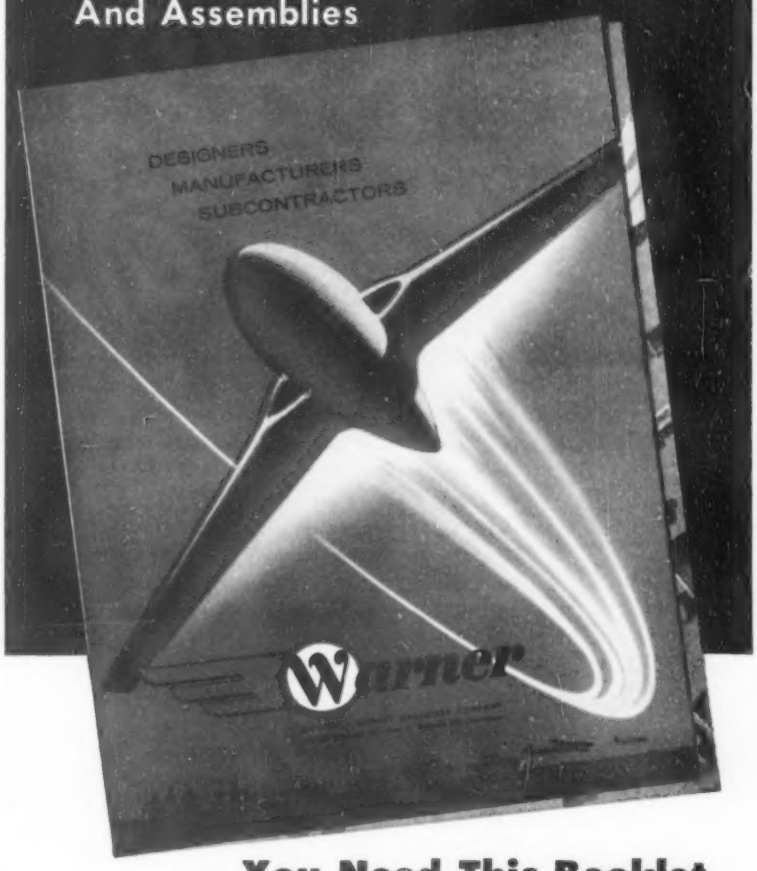

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Send today for your copy of the illustrated booklet shown above describing Warner's complete facilities. Warner engineers will welcome the opportunity to discuss your requirements with you.

Warner DIVISION OF DETROIT HARVESTER COMPANY
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Warner Branch Offices

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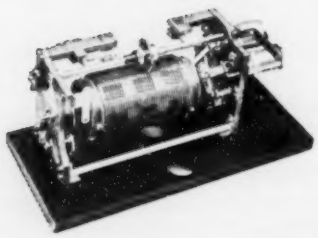
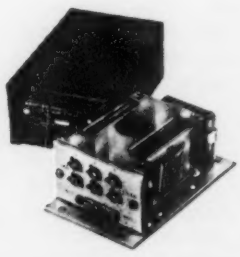
because... WHITE INDUSTRIES efficiently and economically solves their **most difficult** contract manufacturing problems. WHITE mass produces the complex high voltage tank coil shown below for the world's largest manufacturer of airborne communication equipment. 225 high precision miniaturized parts are meticulously assembled to insure perfect coordination at 1000 RPM operation. High start and stop stresses require skillful manufacturing to produce units with "real" stamina. World's largest airframe assemblers save weight, build payloads and instrument dependability... cut maintenance costs by using another WHITE component, the new Power and Phase Converter. Now this USAF qualified and approved Converter is available for immediate delivery at a new reduced price made possible by larger scale production and sweeping engineering advances.

Small and large orders are rapidly executed at lower ultimate costs. Convince yourself. Let WHITE INDUSTRIES engineers quote on your **most difficult** manufacturing problems today!

Technical information on illustrated units sent on request.



ELECTRONIC TANK COIL



POWER AND PHASE CONVERTER

AIRCRAFT DIVISION
WHITE INDUSTRIES INC.
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MIDWEST SALES Caine Sales Co., 3020 N. Cicero Ave., Chicago 41, Ill.
WEST COAST SALES M. B. Gilbert Co., 4214 W. Manchester Ave., Los Angeles 45, Calif.

Submerged Booster Aids Fast Climbers

New line of Lear fuel booster pumps is designed to maintain high flow of bubble-free fuel while plane is climbing at 2,000 ft./min.

Produced by the Lear-Romec Division, Elyria, Ohio, the new Series RG-11260 pumps weigh 4 lb. and deliver 200 gph. at 19-20 psi., or 100 gph. at 20-21 psi. The booster pump permits the engine-driven pump to function normally for faster rate of climb.

Variety of discharge ports is available, including the swivel type. Fully submerged in the fuel tank, only the pump's electrical leads and plumbing connections are exposed outside. Explosion-proof motor cover is vented to outside. Shaft seal, under motor, is drained to assure dry, vapor-free operation.

OFF THE LINE

October production of the LPA-70A flush-mounted loop antenna is planned by Bendix Radio. Almost 100 orders are in. The firm's new ADF-70A, ½ ATR-size receiver will be available next spring, the company announces.

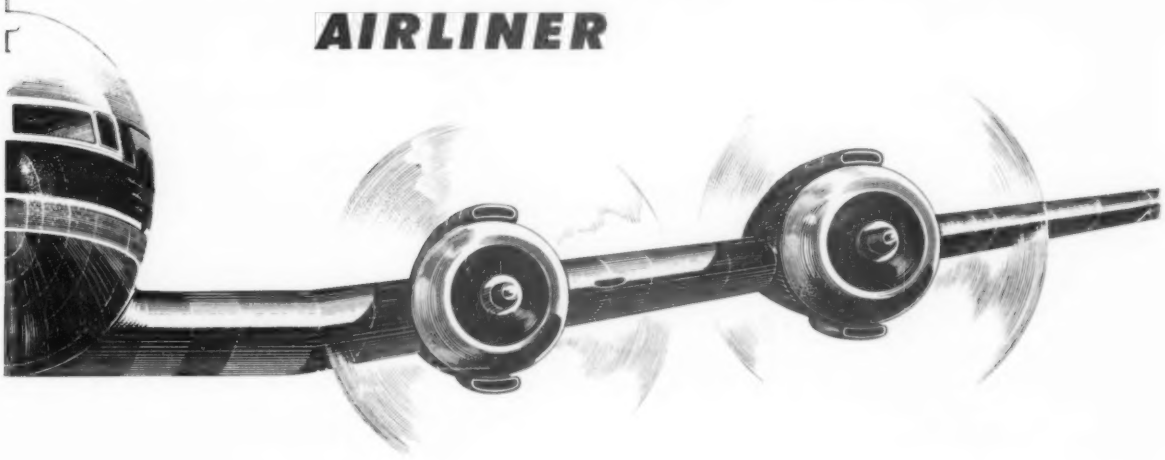
National Airlines will begin evaluating a Bendix Radio RDR-1 airborne radar system on one of its DC-6s beginning in October, according to the manufacturer.

Talkie-Tractor

United Air Lines expects to save more than $17,000 annually in gasoline costs at San Francisco Airport alone by installing a $400 standard two-way radio on its plane tractors. The radio is used by the driver to get clearances from the tower. The savings come in towing DC-6s instead of taxiing them from the maintenance base to the terminal. A minimum of eight DC-6s daily make this one-mile trip. Taxiing, each DC-6 burns 30 gal. of fuel costing 20 cents/gal. The tow-tractor uses less than half-a-gallon of auto gas. Radio maker is Communications Co., Coral Gables, Fla.

Always finest and fastest . . .

Now THE WORLD'S CHAMPION LONG-RANGE, NON-STOP AIRLINER



New DOUGLAS DC-7C

Adds 1000 miles to non-stop flight limits . . .

Adds up to 70 mph to cruising speed

Here is the first truly Intercontinental passenger airplane. This Douglas distance champion will carry competitive payloads up to 5000 miles non-stop . . . makes possible unrefueled flights like those illustrated . . . and because of its range and speed, promises to revolutionize air travel and airline operations between continents.

Longer wings to carry more fuel also allow engines to be moved further away from the cabin, making the DC-7C even more *quiet* and *comfortable*.

Already ordered in quantity by Pan American World Airways, these new model Douglas transports are scheduled to begin intercontinental service in 1956.

DOUGLAS

Twice as many people fly Douglas as all other airplanes combined

Motorists: here's proof...

Gulf's cleaner-burning, super-refined gasoline solves today's No. 1 engine problem!

This lamp is burning the "DIRTY-BURNING TAIL-END" of gasoline which GULF refines out
This lamp is burning NEW SUPER-REFINED GULF NO-NOX, the cleaner-burning super-fuel

Laboratory tests promised...

. . . these *immediate* and *lasting* benefits from this new, super-refined fuel:

More complete engine protection than from the so-called "miracle-additive" gasolines. Why? Because Gulf refines *out* the "dirty-burning tail-end" of gasoline (the No. 1 troublemaker in high-compression engines)—and then treats this new Super-Refined NO-NOX to give it a *complete range of protective properties*. It protects *every* part it touches against carbon, rust, gum.

Extra gas mileage in all your everyday, short-trip, stop-and-go driving.

No knock, no pre-ignition. Why? Because the anti-knock power of new Gulf NO-NOX has been stepped up to an all-time high.

Stall-proof smoothness. Instant *starts*, too—and fast, fuel-saving warm-up.

That's why new Super-Refined Gulf NO-NOX gives your engine more power-with-protection than you've ever known.

Road tests proved...

These cars, powered by New Gulf No-Nox, actually performed better than new . . . after 15,000 miles!

True! After 15,000 miles per car—covering all conditions of city and country driving—Gulf test cars showed these results:

- Higher-than-new horsepower!
- Better-than-new on gasoline mileage!
- And not a single trace of carbon knock or pre-ignition at any time—even on the steepest mountain grades!

COMPLETELY NEW! SUPER-REFINED

New Gulf No-Nox

THE HIGH-EFFICIENCY GASOLINE

GULF

Aviation Insurance Experience 1949—1953

Policy Year	Net Direct Premiums Earned	Incurred Losses*	Paid Losses*	Loss Reserves Dec. 31, 1953	Loss Ratio (Incurred Losses Premiums Earned)
HULL GROUND COVERAGES					
1949	$5,064,383	$1,325,690	$1,322,524	$3,166	26.18%
1950	5,892,383	997,779	989,629	8,150	16.93
1951	4,567,521	1,353,268	1,338,023	15,245	29.63
1952	5,721,039	1,999,110	1,314,483	394,627	28.13
1953	2,789,956**	1,448,267	859,017	589,250	51.91
Total	$24,035,282	$6,734,114	$5,723,676	$1,010,438	28.02%
HULL CRASH COVERAGES					
1949	$8,247,155	$3,214,542	$3,210,932	$3,590	38.98%
1950	11,223,777	5,053,042	4,974,169	78,873	45.02
1951	7,577,201	4,537,408	4,457,357	80,051	59.88
1952	12,996,468	8,861,273	8,107,176	754,097	68.18
1953	5,589,623**	4,144,592	3,753,049	391,543	74.15
Total	$45,634,224	$25,810,857	$24,502,703	$1,308,154	56.56%
AIRCRAFT PASSENGER LIABILITY					
1949	$4,404,930	$2,807,313	$2,484,807	$322,506	63.73%
1950	8,125,626	3,774,949	3,080,215	694,734	46.46
1951	6,460,601	5,769,090	3,221,986	2,547,104	89.30
1952	6,398,294	4,942,499	1,223,007	3,719,492	77.25
1953	4,131,040**	3,079,516	162,271	2,917,245	74.55
Total	$29,520,481	$20,373,367	$10,172,286	$10,201,081	69.01%
PERSONAL ACCIDENT (INDIVIDUAL & GROUP)					
1949	$2,385,581	$829,895	$829,895	.....	34.79%
1950	3,145,762	832,291	804,386	$27,905	26.46
1951	3,491,121	857,055	740,766	116,289	24.55
1952	3,850,073	412,493	374,656	37,837	10.71
1953	2,646,799**	643,889	478,519	165,370	24.33
Total	$15,519,336	$3,575,623	$3,228,222	$347,401	23.04%

NOTES: * Including Allocated Claim Expense.
** Estimated Earned Premiums.

SOURCE: Company Service Corp., statistical agent for the New York Insurance Department

Are Air Insurance Rates Too High?

Excellent safety record of airlines indicates some are: but jet transports will pose multi-million-dollar risks.

Aviation insurance has developed into a high-dollar-volume item and an important factor in airline operations and costs. However, the continuing excellent safety record of the scheduled carriers suggests that rates for some types of insurance are higher than they need be.

A recent compilation for the New York Insurance Department highlights these factors for the five policy years ended Dec. 31, 1953, for separate types of aviation insurance coverage. It includes operations of U. S. domestic and international airlines. Experience of only insurance stock companies is involved, but this is believed to represent the bulk of protection written.

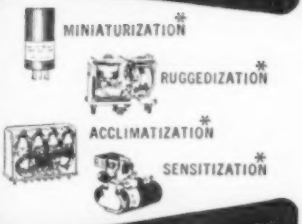
► **Jet Challenge**—While the over-all aviation insurance picture has shown consistent improvement, with generally declining loss factors, the risk companies will be confronted with new challenges in uncharted areas when the jet transport makes its entry into regular commercial service.

An insurance executive recently noted that liability limits will have to be increased because the aircraft which will be used in the future will be bigger, faster, more complicated, and more expensive. Jets may cost over $3.5 million each and the 100 passengers each plane may carry represent an additional $2.5-million liability. Further, as several jet planes may be at the same airport simultaneously, catastrophe exposure of over $15 million has been forecast.

It was also indicated that insurers may not be able to spread jet risks over many units because the number of large

relays

Potter & Brumfield
. . . leading manufacturer of relays for every electrical and electronic use. Design, engineering and production facilities geared to your individual requirements. *



Write for Catalog No. 122 showing complete line of P & B relays.

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PRINCETON, INDIANA

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"SMALL BUSINESS HELPS BIG BUSINESS GO" says Superintendent of Maintenance Joe Salzman, General Motors Corporation

We rely on Airwork to supply Pratt & Whitney engine overhauls that keep the entire General Motors airplane fleet ready to go—Anywhere—Anytime—On an hour's notice.

We demand the utmost in engine reliability to keep the GM fleet *"available for service."* Airwork overhauled our *new* 1830-75 engines to correct deterioration that may have developed in the long storage time before we put them in service. By using the specialized skill of Airwork, which is qualified as Pratt & Whitney's East Coast distributor, GM helps a small business grow.

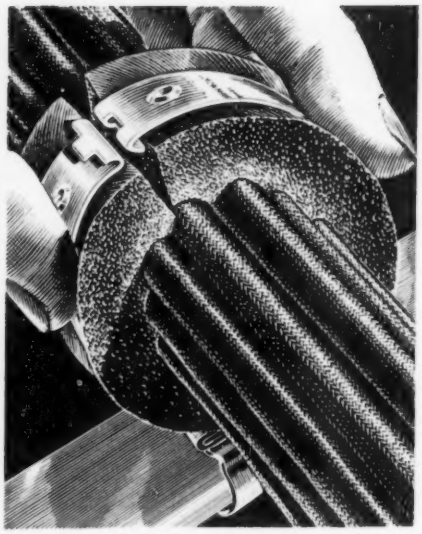
Mr. Salzman became a pilot during the barnstorming era, 35 years ago. He flew Fisher's F10 and F32 Fokkers (1929-31), owned an aircraft sales and service outfit, and has held a wide variety of positions in the aircraft industry.

Airwork CORPORATION
Millville, New Jersey
NEW YORK MIAMI WASHINGTON

Trouble-shooting made easy

DOT wire harness bands

Wires can be removed or replaced one-handed, without removing the bands. Spring tension prevents accidental opening. Resilient, moisture-proof lining insulates wires, cushions them against chafing. Lining will not pull loose. Made in seven standard sizes from 3/16" to 2" diameter.



Available with swivel (above) rivet, snap-fastener or snap-on clip mountings.

MONADNOCK MILLS
San Leandro California

Subsidiary of UNITED-CARR FASTENER CORP.

...behind a constant-speed Airliner Met-L-Matic propeller by McCAULEY

From hub to tips the new Met-L-Matic propeller is engineered to put confidence into your flight. Available for 0470 Series engines, feathering and non-feathering models. Check its outstanding features and make it a must to fly behind an Airliner Met-L-Matic at your first opportunity. *Like riding on a cloud!*

✔ Check these features

Sealed-in, factory-lubricated, pitch-changing mechanism.

No pitch-changing parts exposed to weather.

Hydraulically operated. Holds RPM accurately without wavering or surging.

Forged Aluminum Alloy hub and blades for high strength—low weight.

Better Design Means Minimum Maintenance and Lower Operational Cost.

McCAULEY INDUSTRIAL CORPORATION
1840 HOWELL AVE.
DAYTON 7, OHIO

MET-L-MATIC FORGED STRENGTH

"World's largest maker of metal propellers for personal and business aircraft . . . more than 40,000 Met-L-Props, and now the new Met-L-Matic."

planes in operation will diminish. For example, it is asserted that the approximately 725 four-engined transports now estimated to be flying in the Western Hemisphere could be replaced by one-third as many jet-powered transports.

It is a resonable expectation, however that, with the event of jet transports, the insurance companies writing the necessary protection will set their initial rates sufficiently high to provide for every possible contingency. This factor may be reflected in initially higher operating costs for jet transports as they are placed in service.

▶ **Hull Damage**—In studying the insurance picture with regard to today's transports, it is best to take a five-year average, the experience of any one given year may be misleading. It can be seen that the largest volume of aviation insurance is written on hull crash coverages. For the five-year period up to Dec. 31, 1953, more than $45.6 million in direct premiums has been earned in this category.

From such earned revenues the insurance companies must provide revenues for losses, commissions, overhead expenses, and a net profit. In this instance some 56.6% of earned premiums for the five-year period was offset by incurred losses. Of these incurred losses, $1.3 million awaited further processing to be paid.

Damages to aircraft hulls on the ground is also great, but the loss experience is materially lower than hull crashes. For example, hull ground losses for the five-year period averaged but 28.02% of premiums earned. It is likely that the continuation of this low loss experience may bring pressure for lower rates in this category.

▶ **Good Economics**—The total number of aircraft operated by U. S. carriers increased from 1,358 at the 1949 year-end to 1,665 at the close of 1953, but there has been no relationship between the increased numbers and the premiums earned. Premium revenues were largely dictated by the accident factors, which were soon reflected in the higher premiums earned in 1950 and 1952. On this basis alone the indications are clear that it is sound airline economics to maintain an excellent safety record.

Loss experience on aircraft passenger liability has averaged the highest of all among the major categories, reaching 69.01% for the five-year period.

The best insurance experience has been in the individual and group personal accident group. The average loss ratio of 23.04% here for the past five-year period would suggest a further reduction in premium costs if present trends are maintained.

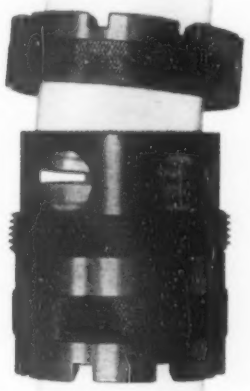
—Selig Altschul

Are You Interested In WEIGHT REDUCTION?

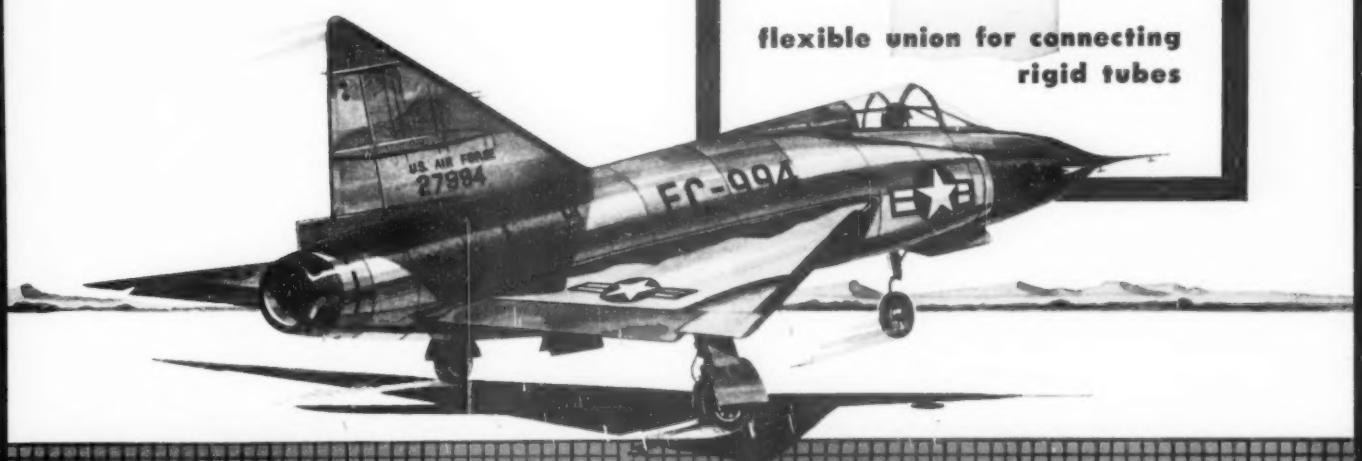
WIGGINS COUPLINGS SAVE 49 POUNDS ON CONVAIR F-102

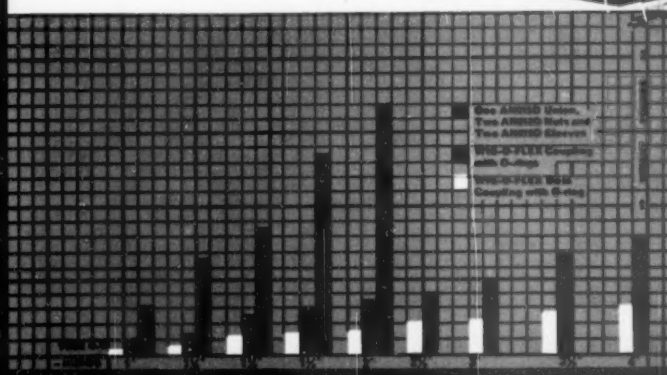
The new CONVAIR F-102 is 49 pounds lighter because WIG-O-FLEX Couplings replaced standard AN connections and cut hose. We are gratified that engineers at CONVAIR—the company that prides itself on Engineering to the Nth power—chose WIG-O-FLEX Couplings for a plane where weight was a major problem. The WIG-O-FLEX Coupling weighs 1/5 as much as the standard AN connection it has replaced. (See weight chart for exact comparisons.)

WIG-O-FLEX COUPLING



flexible union for connecting rigid tubes





WEIGHT COMPARISON CHART

PROVED SUPERIOR FOR FUEL, OIL, AIR

- [illegible]
- [illegible]
- [illegible]
- Temperature range -65°F to +250°F.

SIZES: [illegible]

Wiggins

E. B. WIGGINS OIL TOOL COMPANY, INC.
3424 East Olympic Boulevard, Los Angeles 23, California

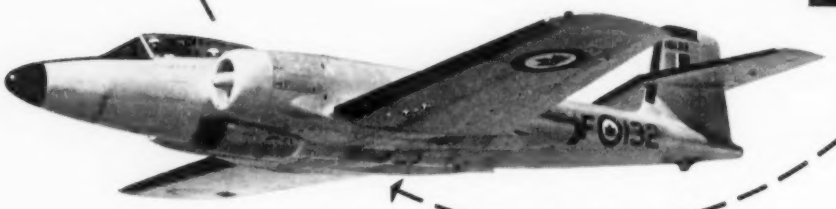
WRITE FOR FURTHER INFORMATION

J. F. Mandrow (left) and T. W. Connolly prepare a problem in dynamic analysis of an interceptor fire control system for solution on analog computing equipment.

B. D. McVey (foreground) and E. Foxma examine operation of interceptor fire control system with equipment simulating in-flight performance of target, fire control system, and interceptor.

PLANNING PERFORMANCE

In the development of advanced radar fire control systems for all-weather military aircraft, system design objectives are determined by systems engineering and analysis. To implement these objectives the next step is the detailed analysis, design, and evaluation of the individual subsystems and units.



The Avro Canada CF-100 of the RCAF is one of the all-weather interceptors equipped with Hughes radar fire control system.

At Hughes special simulation equipment is used to synthesize aircraft and system performance. The simulator provides a means for examining system performance under laboratory-controlled conditions. In the case of airborne systems such study would otherwise require hundreds of hours of expensive flight testing to achieve comparable results.

Three important aspects of this work are:

Determination of effects on over-all dynamic stability of items such as dynamic range of amplifiers, filtering included to reduce effects of noise, aerodynamic response characteristics of the aircraft, and characteristics of computers.

Evaluation of existing systems, subsystems, or units to determine degree of modification necessary in order to meet new installation or performance requirements.

Assessment of completed systems under simulated operation to establish performance before start of production. Simulator studies are correlated with actual flight tests, helping to predict in-flight performance with reduced flight testing.

SYSTEMS ENGINEERS—CIRCUIT ENGINEERS

Further advancements in the field of radar fire control are creating new positions on our Staff for engineers experienced in the fields of systems engineering and circuit design, or for those interested in entering these areas.

Assurance is required that relocation of the applicant will not cause disruption of an urgent military project.

Scientific and Engineering Staff

HUGHES

RESEARCH AND DEVELOPMENT LABORATORIES

Culver City, Los Angeles County, California

AN BOLTS! NAS BOLTS!

Immediate delivery from the world's largest stock of aircraft parts!

IMPORTANT! Check this ad carefully each time it appears—new offerings, never before advertised, will be listed! This group is just a small sample of our huge stock. Let us screen your inquiries for aircraft parts, accessories, AN and NAS hardware!

AN BOLTS

PIECES		PIECES		PIECES		PIECES	
970	AN3-2A	5,918	-57	2,100	-38A	2,000	-38A
3,928	-DD3	53,309	-60	1,572	-31A	4,440	-40
17,360	-DD4	990	-61	544	-32A	9,474	-46
11,198	-DD4A	963	-66	799	-33A	1,532	-59
4,326	-DD5	747	-72	1,651	-34	2,000	-58A
16,386	-DD6	10,492	AN5-DD5	1,102	-34A	1,194	-60A
7,037	-DD6A	3,000	-DD6	1,200	-36	800	AN26-11A
9,186	-CH6A	7,948	-DD6A	8,612	-47	800	-14
2,125	-DD7A	2,688	AN5-7	1,711	-51	666	-14A
4,890	-DD7	2,543	-C7	1,914	-54	4,000	-15A
3,137	-DD10	1,531	-CH7	1,490	AN9-17	2,300	-17
2,180	-DD11	2,578	-CH7A	932	-DD17A	700	-18A
516	-H11A	85,000	-DD7	9,427	-20	832	-20A
5,680	-DD12	17,753	-DD7A	2,913	-25	3,833	-24A
38,300	-DD12A	1,832	-10	3,900	-26	4,619	-29
1,437	-DD13	3,137	-DD10	6,270	-26A	2,225	-29A
1,989	-DD13A	5,838	-H11A	2,100	AN9-30A	1,100	-31
568	-DDH13A	2,443	-DD12A	1,573	-31A	5,700	-31A
3,428	-H13A	1,550	-DD12	544	-32A	7,500	-32A
1,375	-14	4,638	-15	799	-33A	10,000	-36
7,000	-DD14	9,000	-17A	1,651	-34	28,000	-38
10,000	-DD15A	700	-DD17	3,100	-34A	2,250	-38A
1,120	-DD16	4,743	-DD22	1,500	-36	600	-40
662	-DDH16A	1,279	-25A	726	-41A	863	-40A
2,000	-17	1,380	-H26A	8,612	-47	10,000	AN26-46
2,000	-DD17	990	-30A	3,711	-51	11,000	-48
1,921	-DD17A	5,139	-DD31A	1,914	-54	1,300	-55
6,275	-DD20	44,515	-33	732	AN10-11	1,238	-76
2,375	-DD20A	11,491	-DD34	16,272	-12	530	AN27-14A
1,425	-DD21	16,288	-DD34A	556	-H16	4,327	-15A
1,200	-DD21A	7,697	-DD35	26,305	-17	600	-17
3,382	-DD22	1,684	-36	877	-DD17	650	-19
2,230	-H23A	5,976	-DD36	683	-DD21	671	-19A
882	-DD23	2,740	-40	1,884	-22	7,811	-22
841	-DD24	664	-45A	1,875	DD22	3,292	-34A
619	-DD24A	800	-47A	4,300	-23	26,477	-38
4,339	-H24A	4,298	-50A	614	-DD23	13,826	-42
9,516	-25	911	-75	838	-DD25	800	-44
1,765	-DD25	3,700	AN6-DD4	769	AN12-DD27A	16,380	-48
705	-DD26	3,866	-5	536	-DD40A	2,435	AN28-14
858	-DD27	884	-DD7	534	AN16-DD50	2,451	-16
859	-DD27A	1,776	-10	692	-DD51	662	-20A
871	-DD30	4,000	-DD10	1,291	AN21-6	757	-21A
739	-DD34	3,000	-DD11	2,725	-10	783	-26
595	-DD36	12,296	-H12	936	-11	1,427	-32
1,468	-DD36A	800	-DD12A	610	-18	1,555	-44
7,940	-41	1,443	-DD12	2,000	AN22-6A	10,800	AN29-5
699	-42	1,318	-H13A	3,958	-9	1,413	-16
2,000	-DD42A	8,400	-DD13	1,000	-9A	893	-16A
9,623	-44	831	-DD14	1,441	-10	1,100	-22
1,150	-54	1,575	-DD16A	1,215	-12A	523	-32
568	-61	917	-DDH16A	765	-14	800	-44
985	-78A	3,272	-16A	1,035	-19	5,868	AN29-6G
1,000	-73	850	-H16	2,180	AN23-7A	1,305	AN30-32
4,938	-74	19,000	-17A	6,950	-12	578	-36A
1,553	AN4-DD3	2,200	-DD17	5,225	-13A	3,185	-40A
5,100	-4	3,000	-20A	42,500	-14	1,126	AN32-22
3,889	-DD4	2,652	-23A	4,520	-15	500	-34A
69,743	-DD5	1,880	-H23A	2,761	-15A	547	AN34-42A
493,537	-6	3,582	-24	3,733	-19	2,900	AN42-11A
1,586	-H6	3,896	-26	579	-20	508	-12
24,845	-DD6	643	-DDH26A	12,435	-23	1,045	-20
35,649	-DD7	783	-29	16,854	-23A	2,000	-27
6,714	-C7	5,799	-30A	114,447	-24	2,400	AN43-4
4,000	-H7	15,609	AN6-52	16,134	-25	1,694	-7
685	-DD18	1,575	-61	9,400	-27A	533	-11A
3,332	-DD11	34,000	AN7-12	12,140	-29	2,595	-12
1,587	-DD12	1,000	-DD12A	990	-32	2,453	AN44-4
3,137	-DD13	4,513	-13	7,000	-34	3,665	-7
526	-DD13A	2,000	-13A	2,320	-44A	1,128	-17
548	-H13	3,995	-DD13	1,888	-48A	3,100	-22
5,000	-DD14	3,850	-H13A	57,614	AN24-8	6,300	-24
713	-H14	2,679	-14A	1,736	AN24-8A	767	AN45-5
1,380	-DD15	1,419	-16	1,000	-9A	1,765	-6
600	-16A	5,723	-17	31,895	-9	1,931	-14
1,000	-DD16A	2,813	-20	102,000	-10	914	AN46-6
5,422	-DD16	1,221	-22	2,183	-18	4,469	-7
2,678	-17A	6,920	-H24	800	-23	600	AN47-21
7,592	-C20	1,200	-26	562	-29A	872	AN48-11
1,190	-DD20	6,069	-31A	1,840	-30A	5,600	AN73-6
1,700	-DD21A	2,600	-DDH30A	5,714	-31	142,000	-A10
3,949	-DD22	530	-33A	24,920	-32	43,184	-A11
1,200	-DD22A	6,915	-35	2,320	-48	666	-17
632	-23	5,326	-52	1,875	-48A	1,300	-43
3,783	-DD23	1,988	-71	1,232	-70	1,385	-50
4,388	-DD24	4,611	-H6A	7,000	-72	2,280	AN74-2
1,979	-DD26	545	-10	2,214	-78	1,400	-A11
1,347	-27	5,655	-DD13	10,800	AN25-9	4,870	-A12
500	-DD27	923	-DD14	1,494	-10	4,816	-A13
5,255	-DD30	2,261	-DD15	2,640	-12	2,900	-16
3,793	-DD30A	3,229	-16	15,452	-12A	3,476	-16A
774	-DD31	5,000	-17	3,768	-13A	676	-A33
2,232	-32	540	AN8-DD17	18,353	-14A	6,672	-37
4,886	-32A	1,556	-20	52,445	-15A	684	AN75-3
1,151	-DD32	1,827	-22	28,000	-17A	521	-A4
1,300	-DD35A	1,606	-DD22	7,000	-19A	550	-6
21,406	-40A	1,545	-DD22A	6,716	-21A	809	-A30
1,428	-DD41	558	-DD23	5,100	-23A	918	-A31
1,412	-42	1,490	-17	56,000	-24	1,709	-41
1,392	-DD42	932	-DD17A	2,716	-30	6,956	AN76-5
928	-46	9,427	-20	5,400	-34	1,553	AN78-25
25,646	-50	2,913	-25	23,000	-34A	970	AN79-25
1,000	-52	3,900	-26	3,665	-36	3,397	-A25
800	-55A	6,270	-26A	17,613	-38		

NAS BOLTS

PIECES		PIECES	
25	NAS45-8-1	49	-20
147	-8-2	334	-21
346	-8-10	66	-A21
34	-8-13	33	-A21.5
345	-8-15	45	-H25
532	-10-3	518	-26
38	-10-5	455	-33
194	-10-10	402	NAS59-31
24	-10-11	100	NAS59-32
32	-10-16	1,815	-50
761	-12B	126	-56
100	-23	50	NAS60-26
1,460	NAS53-A5	67	-53
493	-A7	135	-A51
1,434	-A11	214	-A51.5
1,700	-A12	74	-A54
600	-A13	3,530	NAS62-16
200	-13.5	49	-A16
456	-15	175	NAS80-A11
353	-16	89	NAS144-3
1,286	-25	200	-DH10
370	-27/5	9,100	-13
55	-50	335	-14
639	NAS54-A6	287	-15
4,340	-A6.5	224	-18A
205	-7	1,105	-19
60	-AH7	28	-20
482	-7.5	1,874	-21
471	-10	200	-20
53	-H10A	87	-22
2,078	-A11-5	1,004	-23
160	-A13	384	-24
1,192	-14	600	-A25
536	-H14	104	-29
6,313	-A14.5	3,222	-30
451	-15	1,821	-31
407	-H15	84	-32
57	-A15-5	95	-33
368	-16	367	-34
285	-17	1,000	-38
80	-A21	48	-41
1,989	-21	10,348	-47
324	-H21	352	-48
796	-22	964	-62
283	-24	1,808	-65
1,240	-25	1,851	-93
143	-A25	242	NAS145-6
150	-A26.5	1,867	-11
135	-A31	600	-15
259	-H31	100	-18
300	-A32	295	-DH20
240	-33	100	-21
160	-A40	144	-A21
44	-A41	187	-22
89	-50	324	-24
469	NAS55-A10	28	-DH24
29	-12	80	-25
738	-14	700	-DH25
1,443	-A14.5	1,367	-26R
36	-15	28	-28
300	-H17	31	-30
429	-21	300	-31
85	-A21	3,628	-32
314	-22	28	-33
780	-25	20	NAS145-34
795	-27	4[illegible]	-38
75	-31	250	-DH42
363	-33	967	-44
95	-34	1,500	-46
585	-35	1,351	-47
48	-71	2,[illegible]10	-60
105	-73	4,469	-68
765	NAS56-A6	1,126	-75
175	-A6-5	47	-83
20,602	-A6.5	684	-86
940	-7	400	-88
6,168	-A7	109	-89
310	-14	200	-300
95	-15	109	NAS146-18
194	-A16.5	49	-21
64	-A17	9,385	-22
18	-A20	230	-22A
173	-26	88	-24
72	-32	483	-DH26
4,128	-A32	318	-D26
128	-36	268	-A28
485	-36	5,288	-29
25	-42	2,290	-30
30,000	-A65	700	-31
268	NAS57-A7	248	-DH34
363	-A10	98	-33
200	-11-45-5	56	-36
297	-13	571	-A42
485	-A16.5	525	-A44
240	-21	181	-62
91	-24	73	-68
471	-25	38	-DH63
644	-26	109	-64
50	-A27	138	-68
50	-A27.5	100	-ADH70
44	-41	224	-73
160	-A45.5	33	-DH73
123	NAS58-A10	30	-ADH75
1,500	-13.5	136	-76

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LOT 2: 00-CWB Westland Sikorsky MK 1-B
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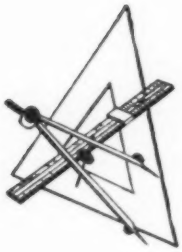

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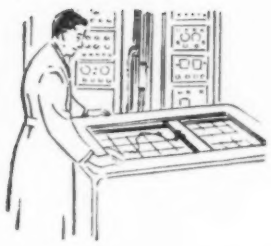

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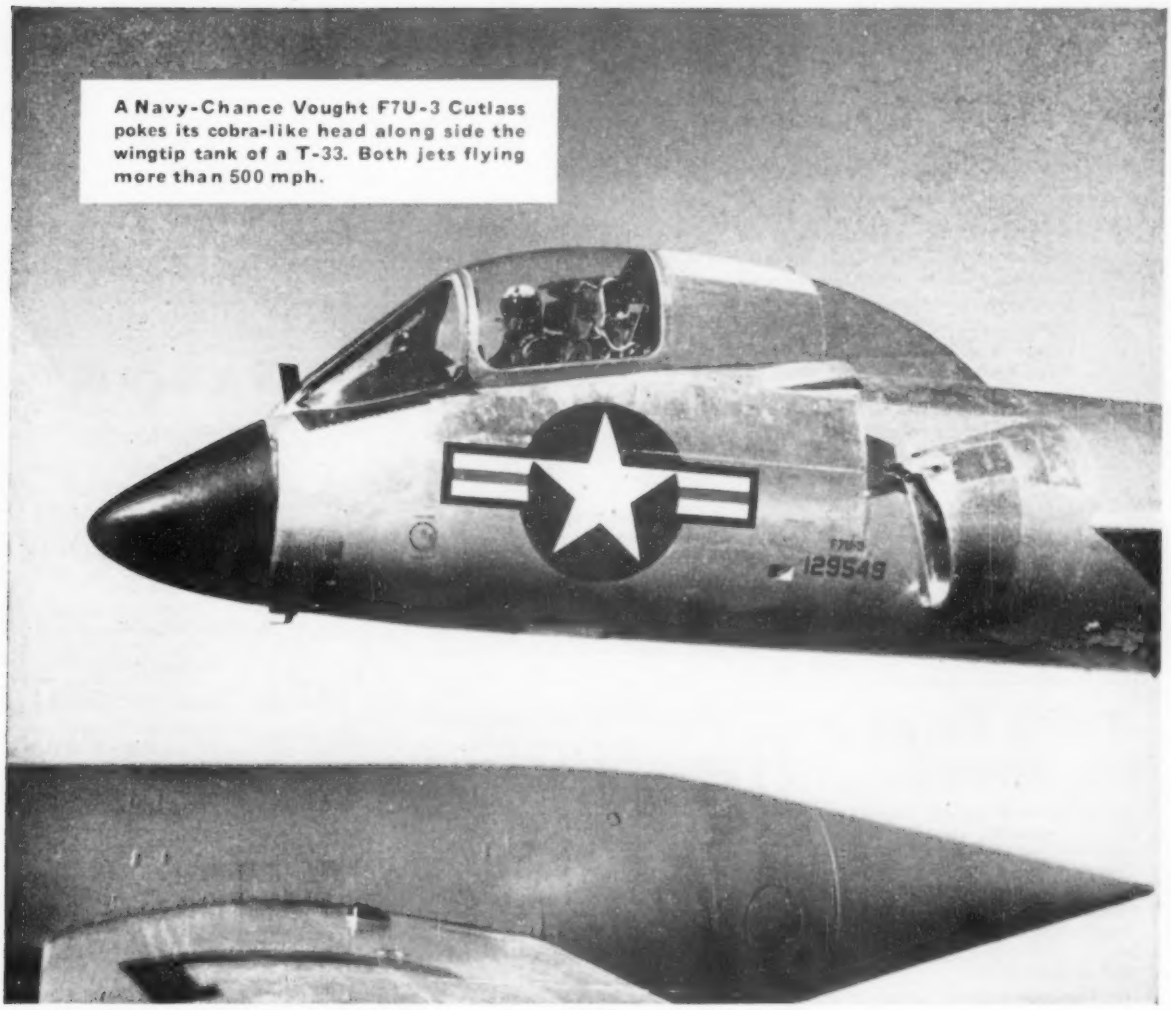

A Navy-Chance Vought F7U-3 Cutlass pokes its cobra-like head along side the wingtip tank of a T-33. Both jets flying more than 500 mph.

Aerodynamicists have little margin for error

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P-3890, Aviation Week
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Report From IATA Convention

Vickers Viscounts Break BEA Records

- **British airline chairman says turboprop traffic marks should make Capital optimistic over 40-plane fleet.**
- **General meeting concentrates on trimming expenses, solving problems of international currency exchange.**

By Frank Shea, Jr.

Paris—Latest appraisal of the Vickers Viscount by British European Airways should give Capital Airlines cause for extreme optimism over its recent purchase of a fleet of the turboprop transports, in the opinion of Lord Douglas of Kirtleside, BEA board chairman.

Lord Douglas, attending the 10th annual general meeting of International Air Transport Assn., told AVIATION WEEK that BEA's Viscounts have been logging an estimated 200,000 mi. weekly and will be responsible for the airline's biggest year in volume of traffic.

▶**New Traffic Highs**—Throughout the BEA network, all records for passenger traffic were broken the first eight months of this year. During April, May and June, traffic was up 12% over the same period last year because of Viscounts, the company chairman says.

The traffic increases have been the result of faster flying time, Lord Douglas says.

BEA's fleet of 20 Viscounts has been in the air day and night, flying between the United Kingdom, the Mediterranean and countries west of the Iron Curtain.

Lord Douglas estimates the airline averaged one Viscount takeoff and landing every nine minutes in the period from 7 a.m. to 9 p.m. during the peak months.

BEA currently is in the process of moving. It is transferring to London's new airport from Northolt.

Lord Douglas predicts that BEA's traffic movements at London next summer will amount to at least half the terminal's total traffic.

▶**IATA Problems**—Meanwhile, the IATA general meeting here began to shift into high gear, with the main theme continuing to be the intensive search for ways and means to cut down operating costs and streamline administration processes. Most member delegates were in agreement that fare increases are impossible at the present time.

All agreed that operating expenses must be brought within a reasonable ratio to gross revenues in order to leave a more healthy margin of profit, that there must be an intensive campaign toward lifting additional government tax restrictions.

The airlines also resolved to take an even closer look at the international organization, with a view to cutting out or streamlining awkward and expensive administrative accounting procedures.

▶**Finance**—One of the highlights of the meeting was presentation of IATA's financial committee annual report by Basil Smallpiece, deputy chief executive of British Overseas Airways Corp., who was chairman.

The report covered joint efforts of airlines to safeguard revenues from risks, difficulties with currency fluctuations, simplification of accounting of interline transactions and a further plea for reduction of tax and statistical demands of governments.

Total turnover of international air traffic transactions handled by the IATA Clearing House since it began operations in 1947 has passed $1 billion and is steadily increasing, the committee said.

"While it took almost seven years to reach this mark, continued growth of airline traffic and expansion of Clearing House membership should enable us to achieve the second billion-dollar turnover in less than three years, probably by late 1956," committee chairman Smallpiece said.

▶**Exchange Rate Threat**—There now are 47 airlines employing the Clearing House's services, and the chairman noted that it has been a major means by which airlines have tried to overcome the difficulties of carrying on international business during a period in which some nations have stringent foreign exchange controls and others have currencies which fluctuate in the free market.

This is a major problem that still exists, according to the report, as airlines continue to meet substantial difficulties in some parts of the world in both the sale of services and transfer of funds.

The differences between the official and the free market rates of exchange threatened to undermine the structure agreed to on international rates and fares.

National regulations sometimes prevent airlines from being able to realize proceeds on their operations at the same rate of exchange that they were earned, the financial committee report said.

The financial committee and the traffic advisory committee announced plans for further intensive joint study in a search for remedies for these currency exchange problems.

▶**New Experiment**—Airlines on both sides of the Atlantic are experimenting seriously with new accounting techniques designed to eliminate as much as possible time and expense currently involved in calculating and checking settlements of exchange business, the committee reported.

The industry may be approaching a point, the report said, at which the cost of obtaining accuracy by present methods may be greater than possible losses through calculation errors, which the checking process is supposed to prevent.

The committee said experiments have begun in sampling techniques, in which only a fractional sample of ticket coupons and any other documents which are involved are subjected to close check.

▶**High Priority**—Taxation problems will be given high priority on the committee's work schedule for the coming year because of the "growing tendency towards taxation on various aspects of international aviation which has become evident the past year in various parts of the world."

A new taxation subcommittee will take over the assignment.

The financial committee also reported plans to spend considerable effort in consultation with other IATA groups on related questions of charges for airports and air navigation facilities, both of which could have a marked effect on finances of air carrier companies.

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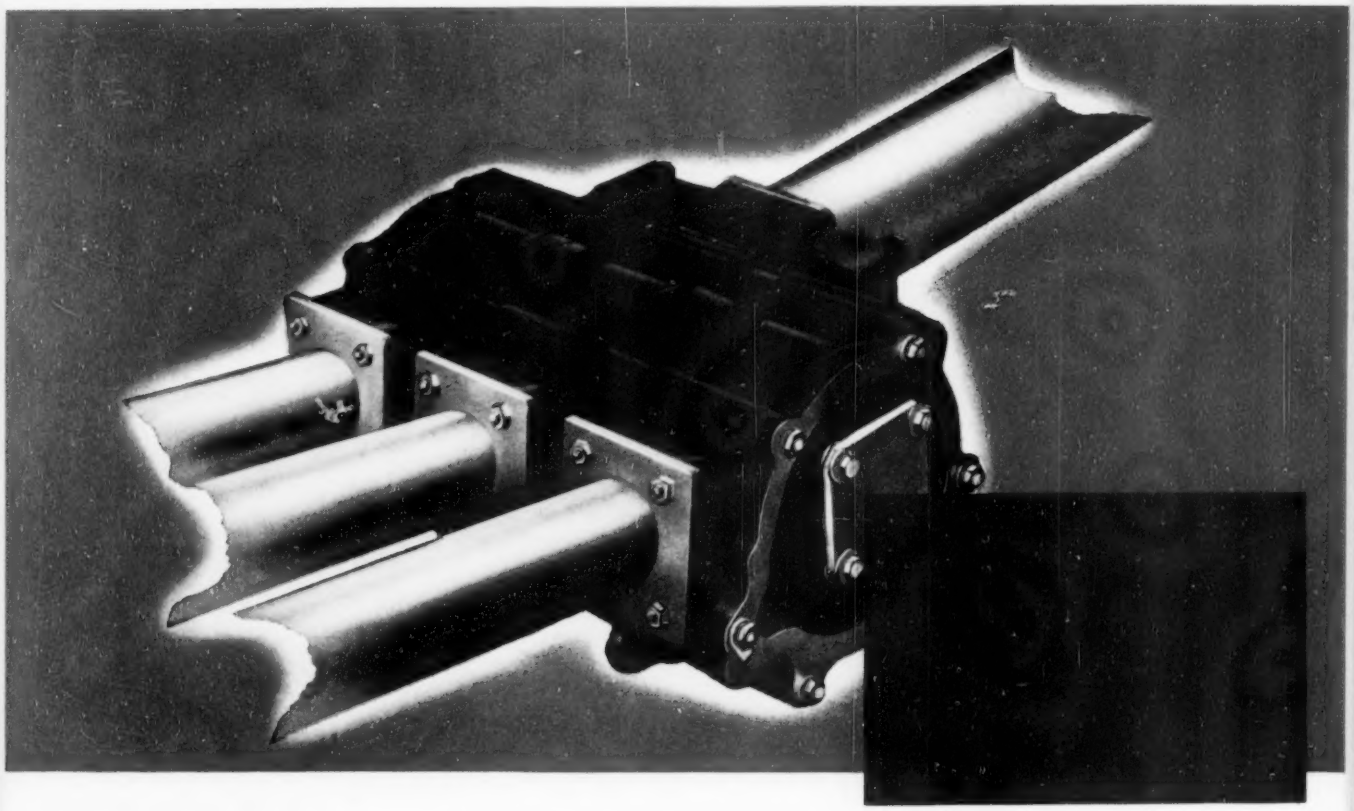

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OPEN FOR BUSINESS, new S. F. airlines terminal can handle five-million passengers yearly.

S.F. Airport Designed for Growth

New $14-million terminal is planned for expansion to a 10-million passenger capacity within six years.

San Francisco—Newest air terminal in the nation, San Francisco's six-story $14-million International Airport, is designed for future growth.

Capable of handling 5 million passengers a year now, the terminal is planned for expansion to 10 million by 1960.

Official opening of the terminal (AVIATION WEEK Sept. 6, p. 7) followed a three-day Flight Festival that drew nearly 600,000 Bay Area residents to the new airport building. Not since the 1939 World's Fair have San Franciscans turned out for an event in such numbers.

United Air Lines president William A. Patterson, after a tour of the new facility, described it as the finest air terminal in the nation.

▶ **Two-Level Design**—Similar in external appearance to the Seattle-Tacoma airport, the building is designed for two-level operation. Arriving passengers and baggage will leave the terminal at ground level exits. Passengers departing from San Francisco will enter the terminal from a ramp one story higher.

Automatic chutes lower baggage from the ticket counters to the ground floor for loading.

Restaurants and bars alone represent a $750,000 investment. Scheduled for completion within a few weeks is the third-floor International Room, expected to be one of the nation's finest airport restaurants.

Airport administrative offices are on the fourth floor, with Civil Aeronautics Administration and Weather Bureau offices located on the fifth and sixth floors.

Parking area will accommodate 4,000 automobiles.

Airmail, express and airfreight are handled in the Air Mail and Cargo building, located northwest of the passenger terminal.

▶ **$50 Million Program**—The terminal is part of a $50-million airport development program. There are four runways of 8,870, 7,750, 7,000 and 6,500 feet. The airport handled 1,927,077 passengers and 74,846,880 lb. of airmail, express and freight during 1953.

Both domestic and international flights will depart from the new building.

The old domestic terminal will be used for charter and private flying and the former international terminal will be converted to a Pan American World Airways office building.

The new airport terminal was designed by W. P. Day.

Delta-C&S Reopens Fight for New Routes

Delta-C&S Air Lines has reopened its long fight to expand its route system northeast to the heavy traffic centers of Washington, D. C., and New York and west to Austin and San Antonio, Tex.

In new hearings before Civil Aeronautics Board, the airline says it must have access to the northeastern financial centers to hold its present position in the industry.

The South now accounts for approximately 10.4% of the nation's entire air traffic, the southern air carrier says, and the bulk of these passengers are headed for New York.

▶ **Existing Gaps**—Specifically, Delta wants to extend its present route structure from Atlanta to New York via Charlotte, Washington, Baltimore and Philadelphia and from New Orleans to San Antonio via Houston and Austin.

The airline also asks for a new route from Birmingham to Memphis.

CAB approval of these new routes will close existing gaps in competitive air service from 26 cities of the South and Southwest to industrial and financial centers of the Northeast without added subsidy to the government, Delta-C&S contends.

▶ **Critical Service**—Chief route at issue is the 774-mi. extension between Atlanta and New York, a service the airline claims is critical to its future and has been needed for the past 20 years.

"Of all the trunk air lines operating predominately east of the Mississippi, only Delta-C&S does not have access to New York and Washington," Delta says.

▶ **14 Roundtrips**—The new service proposed by Delta-C&S would include 14 roundtrips daily—five DC-7 flights, five DC-6 and four Convair 340s.

The airline plans to inaugurate nonstop flights between New York and Houston, Washington and Memphis, Washington and New Orleans, New York and Dallas, Washington and Dallas and New York and New Orleans.

Colonial Airlines Asks For New Merger Bids

Colonial Airlines will ask for new merger bids from National and Eastern Air Lines this week in an effort to end a seven-month stalemate in the proposed consolidation with one of the two trunklines.

In a letter to Civil Aeronautics Board, CAI president B. T. Dykes says his company on Sept. 22 will ask for offers from EAL and National for all assets of the smaller air carrier.

Colonial has set Oct. 20 as the deadline for receiving new bids from the two larger airlines.

▶ **Killing Suspicion**—In order to eliminate any suspicion of Eastern control over CAI, Dykes says his airline will arrange to give independent trustees the voting rights for "all or substantially all" stock alleged to be influenced by Eastern.

Premature control of Colonial by Eastern was the primary reason cited by President Eisenhower when he vetoed the CAI-EAL merger after the Board already had approved it (AVIATION WEEK Mar. 8, p. 51.).

Colonial offered a similar voting trust plan nearly two months ago in an earlier attempt to speed consolidation with either NAL or Eastern (AVIATION WEEK Aug. 9, p. 50).

▶ **Detrimental Delay**—". . . Colonial believes that further delay in effecting an integration with either National or Eastern would be adverse to the public interest and would be detrimental to

Colonial's stockholders and employes," says Dykes.

"Colonial is completely independent and does not believe or have reason to believe that any person or combination of persons under the influence of Eastern controls or has the power to control Colonial."

U.S. Will Keep Flag Lines Strong: Murray

A realistic view of the competition faced by U.S. international airlines from foreign operators and provision for "such backing as is needed to keep them strong" was laid down as present Commerce Department policy last week by Robert B. Murray, Jr., Undersecretary for Transportation.

He spoke in Chicago at a meeting of the National Association of Motor Bus Operators.

Citing the civil air policy report, Murray said it called for determination on a "business basis" how many American-flag airlines can be supported on each international route.

➤ **Healthy Competition**—"I think you will agree," he said, "this is scarcely a monopolistic situation. There is nothing in the report of the Air Coordinating Committee which would make it so. All that we have done is to draw a distinction between healthy, economic competition, and unnecessary, wasteful duplication."

On domestic air service, Murray was equally vehement in his denial that the Administration favors monopolistic practices.

Challenging critics to find evidence that competition is not encouraged, he said the industry cannot be healthy while competition is "propped up artificially by subsidy that is unduly large or prolonged."

Murray continued: "It may not be generally recognized how highly competitive this air transport system is at the present time. Of the leading 100 pairs of airline stations, fully three-fourths have directly competitive service, with many having competing service by three or four carriers. On many routes, the competitive choice available to the passenger by air is greater than by rail or bus."

CPA Polar Route

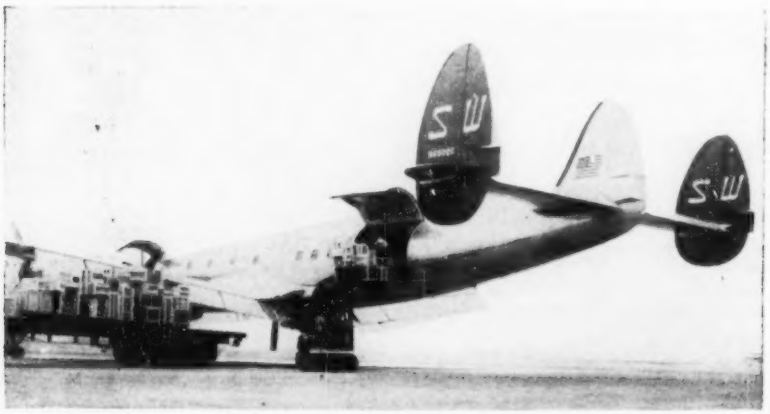
OTTAWA—Canadian Pacific Airlines has asked the Air Transport Board for permission to start transpolar flights from Vancouver to Amsterdam, a short-cut route that would clip 1,000 mi. from the present most direct service between western Canada and Europe.

The airline says it would fly DC-6Bs on the proposed route, laid out so its planes would be no more than 90 min. from an established airport at any time. The flight would have one refueling stop at an unnamed point.

Total estimated flying time for the 4,825-mi. route: 17 hr.

CPA renewed its efforts to establish a Canadian transpolar service because of Scandinavian Airlines System's successful fight for an over-the-pole route from Oslo to Los Angeles, scheduled for inauguration Nov. 15.

The polar route is the only one open for shortcut service by Canadian Pacific, restricted because of Trans-Canada Air Lines' status as this country's "chosen instrument" on trans-Atlantic flights.



S&WA Gets First of Four Cargo Super Connies

A load of airfreight is loaded through the extra-wide cargo hatch in the first of Seaboard & Western Airlines' four new Lockheed Super Constellations, which can carry an 18-ton payload across the Atlantic. Fuselage cargo space totals 5,568 cu. ft. Plane is fully pressurized, heated and air conditioned. S&WA recently was awarded a $3-million military contract covering a six-months airlift of cargo and personnel to Europe.

➤ **Concentrated Funds**—On the federal airport aid program, Murray charged that previous Administrations scattered the funds "too widely to have any real effectiveness.

"Under our revised policies," he said, "federal expenditures will be concentrated upon those locations and types of construction which are most essential for the overall efficiency and safety of aviation operations and for national defense."

Murray further claimed that "we have greatly improved the efficiency of the navigational and other services" for aviation.

CAL-Pioneer Merger Stirs Feeder Protest

Opponents to the merger of Continental and Pioneer Air Lines claim the proposed consolidation would endanger the future of local service air carriers.

But C. E. Leasure, CAL representative in hearings before Civil Aeronautics Board, says Continental's purchase of the smaller feederline would result in better service to the public and decreased cost to the government.

CAB examiner T. L. Wrenn has recommended Board approval acquisition of Pioneer by Continental.

James F. Bell, appearing for Central Airlines, says: "The acquisition of a local service carrier by a trunk carrier represents the first step in the destruction of the two-level trunk and local service air transportation system which the Board has so carefully developed over the past 10 years in this country."

Hubert A. Schneider, Braniff Airways representative, sees the possibility of other feederlines being absorbed by the trunks if a favorable decision in the Pioneer-Continental hearing sets a precedent in that direction.

"How you decide the fundamental policy questions presented by the acquisition of Pioneer by Continental in my opinion inevitably foreshadows the road you take from here on out with respect to the local service airline," he says.

Appearing for the Bureau of Air Operations, U. Rock Grundman says: "It is the bureau's position that, because of the many similarities of routes and services rendered by Continental and Pioneer, Continental would be able to serve Pioneer's routes adequately and without any loss in the character and quality of this service."

$8-Million Terminal

New $8-million terminal will be built at New Orleans' Moisant International Airport, with construction scheduled to start March 1955.

Completion of the new terminal is estimated at late 1956.

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CAB ORDERS

(Aug. 26-Sept. 1)

DISMISSED:

Pan American World Airways' application for approval of an interlocking relationship, filed jointly with Edward O. McDonnell. McDonnell has withdrawn his acceptance of a directorship with Bellanca Aircraft Corp., making the application unnecessary.

John E. Dale's application for a certificate of convenience and necessity because of default.

APPROVED:

Pan American's joint agreement with various airlines, establishing a special charge for carriage of skis and ski equipment.

Agreements involving Northwest Orient Airlines, Braniff Airways and other carriers concerning inter-company arrangements.

EXTENDED:

Period for filing objections to CAB findings on IATA resolutions. Pan American asked for a 90-day extension; the Board set a deadline of Dec. 1, 1954.

DENIED:

Transocean Air Lines' application for an exemption to operate a charter flight, transporting 65 immigrants from Athens, Greece, to New York.

ORDERED:

Nonstop air service between Norfolk and Atlanta be continued as a separate case, with pertinent portions of applications of Capital, Delta-C&S, Eastern and National consolidated with the investigation docket. Remaining portions of the applications are severed and assigned separate dockets. Other motions and requests predicated on an expansion of the issues are dismissed.

Investigation of Braniff Airways' increased local fares between certain points and suspension of the rates until Nov. 29, 1954.

(Sept. 2-Sept. 8)

ORDERED:

Lake Central Airlines authorization to overfly intermediate points on Route 88, provided no incoming or originating traffic is available.

APPROVED:

International Air Transport Assn. agreements involving amendments to provisions for the regulation and conduct of traffic conferences, until June 30, 1955.

AMENDED:

Pioneer Air Lines' authorization to omit certain stops in Texas between Midland-Odessa and Ft. Worth-Dallas. Abilene is dropped as a mandatory stop.

DENIED:

Southern Airways' application for a temporary exemption permitting service between Gulfport-Biloxi, Miss., and New Orleans, La.

Mohawk Airlines' application for a temporary exemption to serve White Plains, N. Y., as an intermediate point between New York-Newark and Binghamton, Endicott-Johnson City, N. Y.

Southwest Airways' motion to dismiss application of United Air Lines for modification of its certificate for Route 1, involved in the Southwest certificate renewal case.

Transocean Air Lines' application for an exemption to carry a group of students from Manila, P. I., to Oakland, Calif.

GRANTED:

San Francisco Chamber of Commerce and Monterrey Peninsula Airport District's petitions for leave to intervene in the Southwest Airways certificate renewal case.

Frontier Airlines permission to inaugurate service to Wolf Point, Mont., using the Wolf Point Municipal Airport.

PAA Asks Domestic Miami-Boston Route

Pan American World Airways has filed an application with Civil Aeronautics Board for a domestic route from Miami to Boston.

At the same time, PAA asked that the application be included in the New York-Florida case, up for a pre-hearing conference Sept. 24.

This is the latest in a series of moves by the airline to get approval of through service to New York via Miami for its Latin American routes. Pan American has been trying to win New York, Washington and other northeastern cities as co-terminals with Miami on these southern routes.

PAA also has attempted to develop interchange arrangements with domestic airlines, but these, as well as other interchange plans for South American connections, are tied up in the unsettled Balboa case.

The application of the international carrier for a domestic route makes it legally eligible for consideration in the New York-Florida case, involving a number of applications for certification for north-south service.

Government Restricts Central African Line

(McGraw-Hill World News)

Johannesburg—Central African Airways must function primarily as a regional and domestic airline, operating only to a limited extent on the main trunk route to Britain, the government has ruled.

CAA recently reported a profit of nearly $35,000 for April, May and June—the carrier's first since an abnormal August 1953, swollen by a heavy stream of visitors attending a centenary exhibition. Total revenue for the three months was about $1.5 million.

In July, the airline topped 7 million passenger-miles for the first time, carrying 12,475 persons over 600,000 mi.

SHORTLINES

► **Air France** reports that Orly Field in Paris has new terminal facilities to handle passenger traffic, which has reached peaks of 3,000 a day. . . . The airline became general agent in the U. S. for Union Aeromaritime de Transport (UAT) Sept. 1., also took over as general agent for West Germany and Switzerland Sept. 15.

► **British European Airways** figures it carried 524,000 passengers in July and August, bringing the total for the first five months of BEA's fiscal year to more than 1 million.

► **British Overseas Airways Corp.** opens a new Chicago ticket office and departure station in the Mallers Building this month. BOAC expects to start first-class and aircoach service out of Chicago next spring.

► **Central Airlines** showed an increase of 86% in revenue passengers carried in August 1954 over August 1953. Revenue passenger-miles were up 110%—1,016,482 over 485,165—for the same two months.

► **North Central Airlines** carried 30,642 passengers in July, an increase of 1,883 over the previous month. Load factor went from 46% to 50% in July. August showed a total of 31,275 revenue passengers.

► **Northwest Orient Airlines** broke its traffic volume record for the third time this year Sept. 3 when 4,018 passengers enplaned on the domestic system. Previous records were set in January and June.

► **Qantas Empire Airways** has added a first-class flight, "The Connoisseur," to its Sydney-San Francisco service. Super Constellations with a capacity of 39 passengers will be used on this run.

► **Swissair** has three new tours available from New York to the Mediterranean area. They run 21, 30 and 42 days; prices range upward from $1,078.

► **United Air Lines** flew 379,605,000 revenue passenger-miles in August, an increase of 39% over the August 1953 mark. Freight traffic amounted to 3,553,000 ton-miles, mail 2,109,000 ton-miles and express 1,052,000 ton-miles. . . . UAL has surveyed its cargo business and come up with a list of 10 top items hauled over the past eight months: Machines and machine parts lead the list; aircraft parts and accessories have slipped to seventh from sixth in 1953.

AVIATION CALENDAR

Sept. 30-Oct. 1—Radio Technical Commission for Aeronautics, fall assembly, Washington, D. C.

Oct. 1-2—Airmail Pioneers, division reunion, Lexington Hotel, New York.

Oct. 4-6—Tenth annual National Electronics Conference, Hotel Sherman, Chicago.

Oct. 5-7—Champion Spark Plug Co., 10th annual Aircraft Spark Plug and Ignition Conference, Secor Hotel, Toledo, Ohio.

Oct. 5-9—Society of Automotive Engineers, National Aeronautics Meeting, Aircraft Production Forum and Aircraft Engineering Display, Hotel Statler, Los Angeles.

Oct. 11-12—Aircraft Industries Assn., symposium on titanium parts, Cleveland.

Oct. 13-14—American Assn. of Airport Executives, 1954 conference on airport management and operations, University of Oklahoma, Norman, Okla.

Oct. 14-15—Illinois Institute of Technology and Armour Research Foundation, National Conference on Industrial Hydraulics, Sheraton Hotel, Chicago.

Oct. 14-15—Institute of the Aeronautical Sciences and Canadian Aeronautical Institute, joint meeting, Montreal.

Oct. 17-22—International Union of Aviation Insurers, annual meeting, New York.

Oct. 18-19—American Society of Mechanical Engineers and American Society of Lubrication Engineers, lubrication conference, Lord Baltimore Hotel, Baltimore.

Oct. 18-22—National Safety Council, Aeronautical Section, Conrad Hilton, Chicago.

Oct. 19-20—Seventh annual New York State Airport Development and Operation Conference, Syracuse, N. Y.

Oct. 21-23—American Society for Quality Control, eighth New England conference, Ten Eyck Hotel, Albany, N. Y.

Oct. 23—Airmail Pioneers, division reunion, VFW Club, Elmhurst, Ill.

Oct. 28-29—Aircraft Electrical Society, 11th annual display meeting, Pan Pacific Auditorium, Los Angeles.

Nov. 1-5—American Welding Society, fall meeting, Sherman Hotel, Chicago.

Nov. 8-9—National Aviation Trades Assn., annual convention and meeting, Biltmore Terrace Hotel, Miami Beach, Fla.

Nov. 8-10—Air Industries & Transport Assn. of Canada, annual meeting, Chateau Frontenac, Quebec City.

Nov. 9-12—Air Line Pilots Assn., convention, Sheraton Hotel, Chicago.

Nov. 10-12—Industrial Management Society, 18th annual time and motion study, Hotel Sherman, Chicago.

Nov. 11-12—Airmail Pioneers, division reunion, Hollywood Roosevelt Hotel, Los Angeles.

Nov. 12-13—National Symposium on Quality Control and Reliability in Electronics, Statler Hotel, New York.

Nov. 14-17—Aviation Distributors and Manufacturers Assn., 12th annual meeting, Mayflower Hotel, Washington, D. C.

Nov. 17-19—California Assn. of Airport Executives, semi-annual meeting, Claire Hotel, San Jose, Calif.

Nov. 29-Dec. 3—American Society of Mechanical Engineers, Aviation Division, annual meeting, New York.

Dec. 17—Wright Day Dinner, Statler Hotel, New York.

Bendix Red Bank

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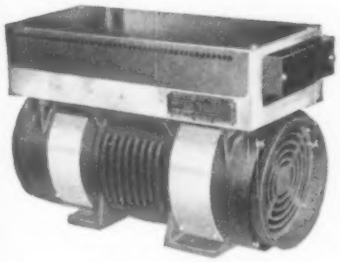

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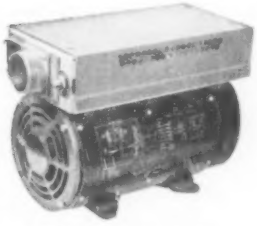

Type MG-54

Specifications
Type 32E03-3
(Conforms to USAF drawing 53B6227 and AN-I-10b)

Input DC	
Voltage Range	26 to 29
Current Range	160 to 180
Current at 27.5 volts	165
Output AC	**Single Phase**
Volts	115 ± 4%
Amperes	21.7
Volt-Amperes	2500
Frequency-cps	400 ± 10
Power Factor	.9 lag to .95 lead
Efficiency	55%
200% load	5 sec.
150% load	5 min.

WEIGHT: Approximately 62 pounds.

MAXIMUM OVER-ALL DIMENSIONS: 7¼" wide x 11¼" high x 17" long.

ALTITUDE	AMBIENT TEMP. RANGE
Sea Level	−55°C to +85°C
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Type MG-54
(Conforms to Navy drawing E-51A1A9 and MIL-I-7032)

Input DC	
Voltage Range	26 to 29
Current Range	24.1 to 21.6
Current at 27.5 volts	22.8
Output AC	**Three Phase**
Volts	115/200 ± 4% (115 ± 4%, single phase)
Amperes	1.25/.723 (2.17, single phase)
Volt-Amperes	250 (single phase, three phase, or single and three phase combined)
Frequency-cycles/sec.	400 ± 10
Power Factor	0.8 lag to .95 lead
Watts at 0.8 PF lag	200
Efficiency	40%
200% load	5 sec.
150% load	5 min.

WEIGHT: Approximately 17 pounds.

MAXIMUM OVER-ALL DIMENSIONS: 5½" wide x 8" high x 12" long.

ALTITUDE	AMBIENT TEMP. RANGE
Sea Level	−55°C to +85°C
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LETTERS

AMC Issue

(We are proud to publish some of the letters received since publication of Aviation Week's *Air Materiel Command issue of Aug. 16. The complete editorial content for the 408-page edition was written by our own staff during late June, July and early August. Those who were not at any one time on AMC issue assignment were redoubling their efforts to replace those who were, so the regular week-to-week issues could appear with their usual high quality. It was a marked achievement by Robert Hotz, Executive Editor, whom we assigned to direct the issue, and by every member of the* Aviation Week *editorial staff in New York, Washington and Los Angeles.—R.H.W.)*

It does a splendid job of covering the functions of the Air Materiel Command. I am taking the liberty of passing this edition along for others to see.

Thomas D. White
General, U.S. Air Force
Vice Chief of Staff
Department of the Air Force
United States Air Force
Washington, D. C.

Please accept my thanks for the personal copy of the Air Materiel Command edition of Aviation Week.

I was very anxious to see the results of your and our endeavors, and I am glad to say that I consider the production a real editorial achievement. It contains a wealth of solid information concerning our command and should be most valuable to numerous people as a ready reference. I further feel that you and your organization have performed a real service to the Air Force and Air Materiel Command in producing this informative edition.

The finished product certainly speaks well for the ability of Mr. Robert Hotz, your Executive Editor, and the members of his staff whose job it was to gather the information and prepare it for publication. Please extend to Mr. Hotz and his staff my personal compliments and thanks for a job well done.

E. W. Rawlings, General, USAF
Commander
Air Materiel Command
Wright-Patterson Air Force Base, Ohio

I have just received the Air Materiel Command edition of Aviation Week and note the very interesting and comprehensive coverage you have given the subject. I am, of course, circulating it to a number of others here who I am sure will find it a valuable source of information.

Donald A. Quarles
Assistant Secretary of Defense
Washington 25, D. C.

. . . It is a very fine piece of work. I . . . was struck by the accuracy of the various articles and the clarity with which our complex organization and procedures are portrayed. I am sure it will be of great benefit to all of our people as well as to industry. It is the most comprehensive piece of work of this type that I have ever read in a magazine.

William F. McKee
Major General, USAF
Vice Commander
Air Materiel Command
Wright-Patterson Air Force Base, Ohio

May I compliment you upon the excellent job done in explaining AMC's role to the country at large and to the aviation industry in particular. This volume probably will go far toward educating many elements of the Air Force itself in the complex role of Air Force support.

Phillips W. Smith
Major General, USAF
Comptroller
Air Materiel Command
Wright-Patterson Air Force Base, Ohio

I think you did an excellent job in depicting the activities of the Air Materiel Command. I am sure it will clear up many points of doubt in the minds of industry. For your information, I have made this number required reading for my key staff officers.

Fred R. Dent, Jr.
Major General, USAF
Commander
Mobile Air Materiel Area
Brookley Air Force Base, Ala.

I found the articles very informative and have heard many commendatory comments from a number of sources, including the commander, AMC. I feel you mirrored the activities of our Sacramento Air Materiel Area particularly well.

If at any time we can be of further assistance to you or your very fine West Coast Editor, Mr. Coughlin, please feel free to call on us.

William T. Heffley
Brigadier General, USAF
Commander
HQ., Sacramento Air Materiel Area
McClellan Air Force Base
McClellan, Calif.

I believe this very fine presentation will do much to strengthen the excellent relationships, established by General Rawlings, between the command and industry.

Paul L. Barton, Colonel, USAF
Commander
Wright-Patterson Air Force Base, Ohio

Permit me to express my appreciation for yours and your staff's efforts in producing the special AMC issue. And while I am on the subject I'd like to compliment you for such a fine group of writers and editors. They know their business, they are industrious, enthusiastic, and loyal to you.

I think the issue will do two things. It will provide our own personnel and industry personnel with guide-posts of our complex operation. Also, I think the briefings for your staff were stimulating and will assist them in interpreting future news.

Erwin G. Morrison, Colonel, USAF
Chief, Information Services
Air Materiel Command
Wright-Patterson Air Force Base, Ohio

Congratulations to Bob Hotz and the other members of your staff who did such a fine job in compiling, writing, editing, and publishing the special Air Materiel Command issue of Aviation Week.

It should prove of much benefit to both industry and the military services. I plan to keep a copy in my reference file for frequent future use.

Leon Booth, Colonel, USAF
Director
Office of Information Services
Air Research and Development Command
Post Office Box 1395
Baltimore 3, Md.

Please permit me to express my sincere compliments for the superior editorial work of your staff in producing the special edition of Aviation Week featuring the Air Materiel Command.

Because of the fact that I had a small responsibility in connection with the edition, I am especially appreciative of the high caliber of the end result. It was a big and difficult job requiring expert editorial management within narrow time limits.

Frankly, though, I was not surprised to find the edition exceeding my original expectations, especially after being privileged to observe your Executive Editor, Robert Hotz, in action. As the former managing editor of a metropolitan daily newspaper, I was in a position to appreciate the difficulty of the many problems facing Mr. Hotz in gathering the necessary materials and basic facts. The ease with which he was able to bring order out of chaos and to inspire enthusiastic cooperation from others places him unquestionably in the expert class. I considered it a genuine privilege to be able to work with him, and I look forward to other opportunities to work with him in the future.

I also wish to invite your attention to the superior work achieved by the members of Mr. Hotz's staff with whom I came in contact. They are Frank Shea, Jr., G. L. Christian and Claude O. Witze. Speaking in my newspaper language, I consider these gentlemen as top-notch reporters and writers—a high compliment indeed. They not only performed their jobs well, but also made many friends for your organization in the process.

I also extend my compliments to Robert Martin, as publisher and as prime mover back of the entire edition. It is an achievement in which he can justifiably take great pride.

Julian B. Cross, Lt. Colonel, USAF
Assistant for Special Events
Air Materiel Command
Wright-Patterson Air Force Base, Ohio

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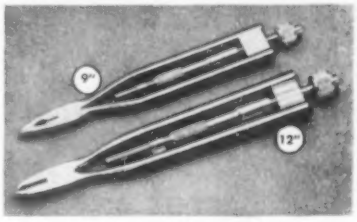

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Following is the last of four installments of extracts from a report to Congress, made by H. Lee White, then Assistant Secretary of the Air Force, outlining major management and operations aspects of the Administration's drive for more efficient use of USAF resources—manpower, money, facilities, and materiel. This series on the new U. S. Air Force will be continued in next week's issue, with publication of the full text of one of the most important official documents on current U.S. airpower policy. —RHW

Management & Operation IV

By H. Lee White

COMMENTS ON 1955 BUDGET

At this point I would like to make . . . general comments with respect to our fiscal 1955 budget.

1. **We have planned to clear up** any personnel overages and shortages that exist and to have the personnel inventory on target by the end of fiscal 1955. This goal is contingent, however, on the Air Force attaining both:

(A) The procurement requirement. This has been established as an average of approximately 11,000 non-prior service people per month, and

(B) The projected reenlistment rate. We have in all our calculations assumed a reenlistment rate of 33%, which we recognize is going to be difficult to obtain. If we could exceed this rate, we would be able to reduce our new procurement of military personnel with consequent dollar savings. On the other hand, if we do not attain a reenlistment rate of 33%, the Air Force may be in real trouble since it appears that we will have difficulty in compensating for any loss in the reenlistment rate through additional procurement.

The problem we face, so far as reenlistments are concerned, is pointed up this year because 70% of the men due for release in fiscal 1955 are first-term airmen who entered the service following the outbreak of hostilities in Korea during the period of high draft calls when motivation was more through duress than desire.

We would like very much to exceed the reenlistment rate of 33% because with a 33% rate we will, by the end of fiscal 1956, have 41% of our airmen with less than two years' service. As a matter of comparison, today only 26% of our airmen have less than two years' service.

Under these facts and circumstances it would appear that everything possible should be done this year to increase the attractiveness of the military career so that our airmen will be encouraged to reenlist. . . .

If we disregard the question of quality for the moment, since it is difficult to put a dollar value on quality, it is my opinion that by the expenditure of funds to restore fringe benefits and to build housing and personnel facilities, among other things, the United States government would, in the long run, be actual dollars ahead.

We have heard at various times various dollar figures stated as the loss to the government when a man does not reenlist. If we take the most conservative and assume that the only loss to the government is the amount of money spent in training the individual, the government will lose, when an airman does not reenlist, $2,500.

As you all know, when an airman leaves the service he receives certain benefits. These benefits include, among other things, mustering out pay; lump-sum payment for accrued leave; if he is unemployed, he may be entitled to unemployment compensation in the amount of $26 a week for 26 weeks; and he has all the rights and privileges of the GI Bill of Rights which includes substantial payments for education.

In addition, he may receive a bonus from the state wherein he resides. It would, therefore, appear that the incentives that exist are incentives to leave the military service. I recognize that as long as we have the draft, these benefits cannot be taken away since they were established to help the serviceman to make up for the losses he sustained because he entered the service of his country. These benefits, from that standpoint, serve a worthwhile purpose, but they certainly make our job harder.

It is also true that these benefits are a cost to the United States and that, therefore, the loss to the United States government when an airman fails to reenlist is not only the $2,500 training cost referred to above but also the amount of money that the government is committed to pay under these benefits.

If we forget all the benefits except the benefit for education, we find that it is estimated that on the average 40% of all the Korean veterans will take some educational benefits and that the average period of education to which they will be entitled is approximately 18 months at an average cost of approximately $100 per month.

The total of airmen whose enlistments expire (excluding those already pre-released) during fiscal years 1955, 1956 and 1957 approximate 635,000. If none of these men reenlist, the total cost to the government would be $2,044,700,000, arrived at as follows: $2,500 training costs for all of the 635,000 men plus $1,800 educational costs for 254,000 men (40% of the total).

A 33% reenlistment rate would, therefore, save the government approximately $681,560,000. If we could raise the reenlistment rate to 60%, we would save approximately an additional $550 million during this period of time. It seems to me that it would be worthwhile to use a part of that savings to pay for those things which might tend to increase the reenlistment rate. . . .

2. **As the Air Force builds** toward 137 wings by only a nominal increase in military strength, we will find that the qualitative composition of the requirement changes. The Air Force can expand its combat structure within the personnel goals we have set for ourselves only by further reduction in support areas.

In these support areas, the officer requirement is based on supervision rather than on flying or technical skills; furthermore, these areas contain few of the technically skilled airmen who make up the bulk of our top non-commissioned officers. For this reason, when we reduced manning standards in the support function, or embark on a project like "Native Son," we do not realize a proportionate reduction in officers or top non-commissioned officers, although, of course, we do make reduction in these areas.

Conversely, the activation of additional combat units within approximately the same military strength, and the increased requirement for flying training will obviously require more officers in flying positions along with a greater number of highly skilled airmen to maintain and operate this force. . . .

We are at the present time intensively making a study of our officer personnel, and we will reduce the requirement as much as possible. The only point I make here is that the reductions in officer personnel may not be large enough to maintain the old ratio since our reduction in airmen in the lower skills is so substantial, and if we continue our policies so much of our savings will come out of the lower skills.

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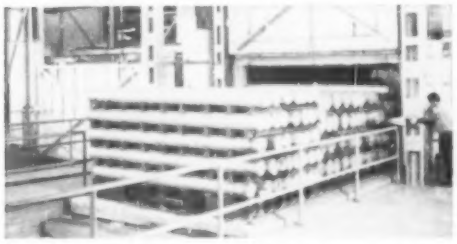

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